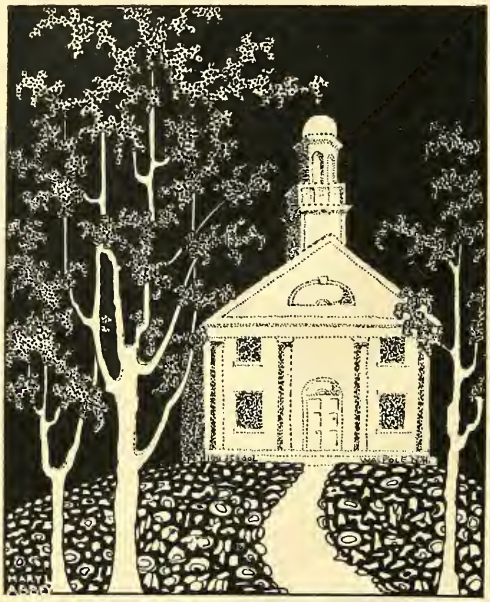

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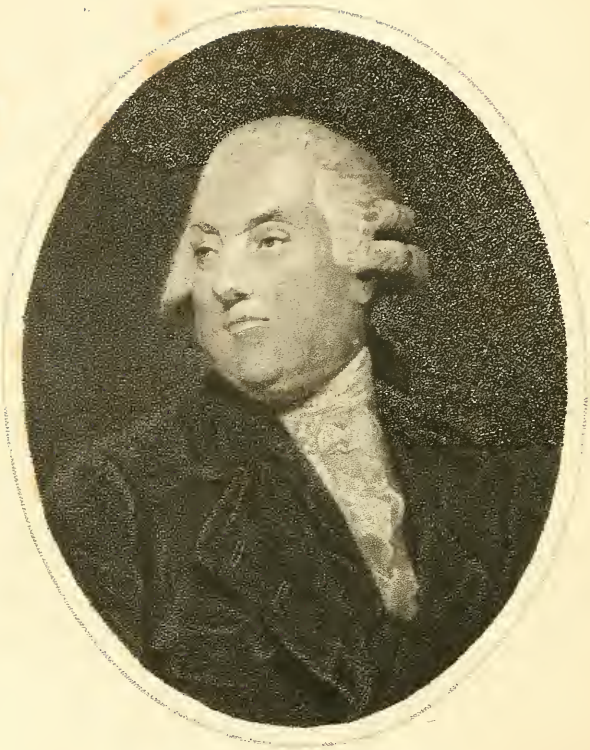

PERCIVALL POTT Esq.r

Engraved by Heath, from a Picture
of Sir Joshua Reynolds.

Publish'd March 10th 1790, by J. Johnson, St. Paul's Church Yard.

THE CHIRURGICAL WORKS

OF

PERCIVALL POTT, F. R. S.

SURGEON

TO ST. BARTHOLOMEW'S HOSPITAL.

A NEW EDITION, WITH HIS LAST CORRECTIONS.

To which are added,

A SHORT

Account of the Life of the Author,

A METHOD OF

CURING THE HYDROCELE BY INJECTION,

AND OCCASIONAL

NOTES AND OBSERVATIONS.

BY

SIR JAMES EARLE, F.R.S.

SURGEON

EXTRAORDINARY TO THE KING, *&c. &c.*

A certis potius et exploratis petendum esse præsidium; id est, his quæ Experientia in ipsis curationibus docuerit; sicut in cæteris omnibus artibus: nam ne agricolam quidem aut gubernatorem disputatione, sed usu fieri. A. CORN. CELSUS.

IN THREE VOLUMES.

VOL. I.

LONDON:

Printed by Wood and Innes, Poppin's Court, Fleet Street.

FOR J. JOHNSON; SCATCHERD AND LETTERMAN; CUTHELL AND MARTIN; LONGMAN, HURST, REES, AND ORME; CADELL AND DAVIES; B. CROSBY, AND CO.; JOHN CALLOW; JOHN RICHARDSON; JAMES RICHARDSON; B. SCHOLEY; E. COX; AND W. GRACE.

1808.

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A

SHORT ACCOUNT

OF THE

LIFE

OF

MR. POTT.

A SHORT ACCOUNT,

&c.

At the time of Mr. Pott's decease, very few copies of his works remaining in the bookseller's hands, I was prevailed upon to superintend and publish a new edition of them: this, also, having been some time since exhausted, a similar application has been made to me respecting another edition.

The encouraging reception of the former, and the high respect which I must ever retain for the author, are sufficient inducements again to lend any assistance in my power to promote the circulation of his valuable instructions.

The writings of Mr. Pott had been universally read, and many of his improvements in the practice of surgery had come into general use, for several years before his death. Most of his

opinions have stood the test of extensive experience; and it is hardly to be doubted, that, whatever improvements have since been or may hereafter be made in this progressive art, his works will be esteemed as a valuable monument of genius and of skill, for the times in which the author lived, to the latest posterity.

The event which put a period to the useful labours of Mr. Pott also closed his account of them: as to the great disappointment of the medical world, little new on any chirurgical subject was discovered among the papers of an author, whose pen was seldom long unemployed. This was not the effect of accident or inattention, but of design, for the last years of Mr. Pott's life were not less industriously spent than the earlier part; nor was the spirit of inquiry or of emulation at all diminished by his advanced age, but he had given his friends every reason to expect that no manuscript would be left; and often censured, in strong terms, the imprudence of authors leaving imperfect papers behind them, which their relations seldom have discretion or disinterestedness enough to suppress. My constant intercourse with him, both on business and in his

leisure-hours, gave me an opportunity of knowing his sentiments on some subjects which had occurred since his last publication. Such of these as materially affected the doctrines he delivered, were noticed in the last edition; and I have endeavoured, in the present, still further to correct, arrange, and add, whatever has appeared to me likely to contribute to the general usefulness of the work.

To my last edition I prefixed a short historical account of the author's life, which I presume will not be unacceptable to the readers of this: the thoughts, the conduct, and actions of celebrated men have been generally considered interesting and useful.

My near connexion with the family of Mr. Pott furnished me with the most authentic information concerning every transaction of his life which could in any way interest mankind, and having been already faithfully and correctly detailed, will be reprinted with very few alterations.

PERCIVALL POTT was born on the 26th of December 1713, in that part of Threadneedle-street which is now the site of the new Bank-

buildings. His father, whose Christian name was Percivall, married the widow of Mr. Houblon, son of Sir Jacob Houblon; and, in 1717, left her again a widow, and him, their only son, with means very inadequate to their support. The deserted state of Mrs. Pott, joined with a deserving character, and many excellent qualities, could not fail of engaging the attention of her friends, among whom was Dr. Wilcox, bishop of Rochester, her distant relation, who took her son under his immediate patronage. Thus she was enabled to pursue a plan for his education and future views in life, which were the principal objects of her maternal solicitude. Mr. Pott returned her tender care with the utmost affection. Indeed, so enthusiastic was his love for his mother, so great the obligations which he always conceived he owed to her, and so unimpaired by time was his remembrance of them, that, to the last, he never mentioned her, but in terms expressive of sensibility and gratitude.

When seven years old, he was sent to a private school, at Darne in Kent, where the instructions, though very confined, were, to a mind

of his quick conception, sufficient to form an early taste for classical knowledge; which, by his own assiduity, without further assistance, was afterwards improved to critical accuracy.

Mr. Pott showed, very early, a strong propensity to the profession of surgery. Some of his best friends recommended the church, in which he had no inconsiderable prospects of preferment; but neither advice nor persuasion could alter his fixed determination. He was accordingly, in 1729, bound an apprentice to Mr. Nourse, one of the surgeons of St. Bartholomew's hospital. In this situation he had great opportunities of improvement, particularly with regard to anatomy, which was at that time little cultivated in London. Mr. Nourse was one of the few who then gave anatomical lectures; his school was at London-house, in Aldersgate-street; and Mr. Pott was employed in preparing the subjects for demonstration, which laid the foundation of his accurate acquaintance with that science, the basis of chirurgic knowledge. In the hospital he found unlimited opportunities of studying the nature and progress of diseases, and of observing practical surgery.

At that time the art was miserably defective; the instruments were clumsy and unmanageable; the operations unscientific, and unnecessarily painful: the established mode of practice, incumbered with a farrago of useless medicines and applications, tended rather to mislead than direct the inquirer; prescription too frequently held the place of reason; and want of real knowledge was concealed under a pompous garb and specious demeanour. Though labouring under these disadvantages, his intuitive genius soon led him to discriminate between right and wrong, taught what to adopt, what to reject; and enabled him afterwards to break through the trammels of prejudice and custom. During his apprenticeship, his natural vivacity did not prevent the application of a very considerable portion of his time to the study of authors in every branch of surgery. Very early in life, he adopted Lord Bacon's advice to a student, to consider one part and one disease at a time, and to become thoroughly acquainted with that before he undertook another: on that plan, he never quitted the immediate object of his inquiry, till he had traced it to every source of information.

Mr. Pott always professed great value and respect for the early writers on the art, and perused their voluminous works with great diligence and sagacity. He frequently observed, that though no great advantage could be derived from them in the practical part, yet whoever studied them would be amply repaid, by their accurate description of diseases, which they pourtrayed from nature. But his reading was not confined to professional books; it was various and extensive; and I think I may venture to say, that his memory never suffered any thing to escape which he had once thought worthy a place in his mind.

In 1736, at twenty-two years of age, having finished his apprenticeship, he immediately applied himself to business. Confident in the fair prospects of industry, he hired a house, of considerable rent, in Fenchurch-street, and took with him his mother, and her daughter by the first husband. Such a young man could not long remain unnoticed: the assistance which is given at the entrance into life is most valuable and most disinterested. Of this Mr. Pott was perfectly sensible, and always acknowledged with

gratitude the obligations which he owed to the fostering favourers of his youth. As the brilliancy of his talents brought his conversation into much request, his connexions were soon universally extended. Besides the families to which his profession introduced him, he became acquainted with most of his cotemporaries of rising and eminent abilities in every profession. The early friendships which he formed were permanent; and it may truly be asserted, that few men have acquired and retained through life more firm or more respectable friends.

In 1744-5, he was elected an assistant-surgeon, and in 1749 he was appointed one of the principal surgeons of St. Bartholomew's hospital. He had now before him sufficient scope for the exercise of those abilities by which mankind have since been so much benefited. The state of surgery was still very imperfect, notwithstanding some sensible and ingenious men, both in this country and in France, had published observations which had enlightened and improved it: still the maxim, "*Dolor medecina doloris,*" remained unrefuted; the severe treatment of the old school, in the operative part and in the ap-

plications, continued in force; the first principles of surgery, the natural process and powers of healing, were either not understood or not attended to; painful and escharotic dressings were continually employed; and the actual cautery was in such frequent use, that, at the times when the surgeons visited the hospital, it was regularly heated and prepared as a part of the necessary apparatus. In the works of several authors, who flourished in the early part of our author's life, we have contrivances for improving these dreadful instruments. Mr. Pott's tutor rigidly adhered to the established practice, and treated with supercilious contempt the endeavours of his pupil to recommend a milder system. But the dictates of truth soon found a welcome reception with the profession, and with the world in general. Mr. Pott lived to see these remains of barbarism set aside, and a more humane and rational plan, of which he was the chief author, universally adopted. Surgery being thus divested of great part of its horrors, became, comparatively, a pleasing study; for, except on those unfortunate occasions, when the humane feelings of the practitioner must suffer, from the unavoidable necessity of giving

pain, the aim and end of the healing art are surely pleasing. To possess the power as well as the inclination to relieve distress, to soften anguish, and in some measure to break the force of those accidents and misfortunes, to which mankind are always liable, must afford to every feeling mind the greatest and most sincere pleasure which it is capable of enjoying.

Mr. Pott's affection for his mother prevented him from forming any attachment during her life, which might separate him from her. In 1746, being, to his sorrow, released from this filial engagement, he removed to Bow-lane, and married the daughter of Robert Cruttenden, Esq.; a lady of whom every thing commendable might justly be said, and who, in mental and personal accomplishments, was formed to be his companion[a].

[a] I may now add (1808), that, at the age of 86, Mrs. Pott still retains her excellent understanding, and faculties unimpaired. In society, cheerful and interesting, with strong powers of recollection and judgment, she attracts around her the young, the old, the grave, and the gay; and, with a pen equal to that of Madame De Sévigné, instructs and delights a numerous set of correspondents.

In the year 1756, an accident befell Mr. Pott; which, though of little consequence in itself, yet, as it displays the vigour and firmness of his mind, and seems to have had considerable influence on his future life, deserves to be recorded in this place:—As he was riding in Kent-street, Southwark, he was thrown from his horse, and suffered a compound fracture of the leg, the bone being forced through the integuments. Conscious of the dangers attendant on fractures of this nature, and thoroughly aware how much they may be increased by rough treatment, or improper position, he would not suffer himself to be moved until he had made the necessary dispositions. He sent to Westminster, then the nearest place, for two chairmen, to bring their poles; and patiently lay on the cold pavement, it being the middle of January, till they arrived. In this situation he purchased a door, to which he made them nail their poles. When all was ready, he caused himself to be laid on it, and was carried through Southwark, over London-bridge, to Watling-street, near St. Paul's, where he had lived

for some time — a tremendous distance in such a state! I cannot forbear remarking, that on such occasions a coach is too frequently employed, the jolting motion of which, with the unavoidable aukwardness of position, and the difficulty of getting in and out, cause a great, and often a fatal aggravation of the mischief. At a consultation of surgeons, the case was thought so desperate as to require immediate amputation. Mr. Pott, convinced that no one could be a proper judge in his own case, submitted to their opinion; and the instruments were actually got ready, when Mr. Nourse, who had been prevented from coming sooner, fortunately entered the room. After examining the limb, he conceived there was a possibility of preserving it: an attempt to save it was acquiesced in, and succeeded. This case, which Mr. Pott sometimes referred to, was a strong instance of the great advantage of preventing the insinuation of air into the wound of a compound fracture; and it probably would not have ended so happily, if the bone had not made its exit, or external opening, at a distance from the fracture; so

that, when it was returned into the proper place, a sort of valve was formed, which excluded air. Thus no bad symptom ensued, but the wound healed, in some measure, by the first intention. — The appearance of Mr. Pott as an author was an immediate effect of this accident[b]. During the leisure of his necessary confinement, he planned, and partly executed his treatise upon ruptures, which was completed by the latter end of the year. It was then not an early period of his life: and it is possible, that the busy scene in which he had hitherto been engaged, might have occupied his mind much longer. As he had been thus led on to the age of forty-three, it is by no means impossible that, without some powerful check to the train of his pursuits, he might never have discovered in himself

[b] I do not find that Mr. Pott had written any thing previous to this, except the relation of a curious case of tumours, by which the bones were softened. This was presented to the Royal Society soon after he began business, and may be found in the 2d part of the 41st volume of the Philosophical Transactions. — It is also inserted at the end of the 3rd Vol. of these Works.

those superior powers of scientifical disquisition, that correct taste and masterly command of language, which have placed him in the first rank of medical writers. Engaged, from early youth, in the constant transaction of business, he probably till this period had indulged but little in the pleasures of speculative investigation, but was never afterwards long unemployed in some literary work. Indeed, the flattering reception of his publications, and the gratification of communicating to the world scientifical improvements, would have been sufficient to confirm a mind, less ambitious of fame than his, in the habits of an author.

In 1757 he wrote an account of the Hernia Congenita, a complaint not then well understood. Dr. William Hunter, the celebrated anatomist, who was engaged in the same pursuit, inserted a paper in the Medical Commentaries, claiming a priority in the discovery. But I do not mean to enter into the merits of a dispute which, though at that time it caught the attention of the medical

world, is now nearly forgotten. Mr. Pott's reply was inserted in the second edition of his Treatise on Ruptures, and is written with elegance and urbanity.

His observations on the disorder of the corner of the eye, commonly called Fistula Lachrymalis, appeared in 1758. This sensible, well written performance on a complaint which frequently occurs, has, both in matter and manner, considerable merit. In it he explains the situation, describes the various appearances of the disease, and simplifies the method of cure: his arguments were the principal cause of discontinuing the operation by the actual cautery, which was practised and recommended by Mr. Chesselden, who flourished in the early part of our author's life.

In 1760 was produced his elaborate performance on the nature and consequences of wounds and contusions of the head, fractures of the scull, concussions of the brain, &c. in which, with a perspicuity till then unknown, he separates and arranges the symptoms of each particular species of injury, unfolds the

causes and situation of mischief, and points out the most probable means of relief.

In 1762 he published Practical Remarks on the Hydrocele, and some other diseases of the testis, its coats, and vessels, illustrated with cases; being a supplement to his general Treatise on Ruptures.

In 1764 he had the honour to be elected a Fellow of the Royal Society; at the same time, he presented them with a curious and uncommon case of a hernia of the urinary bladder, including a stone, which is inserted in the Philosophical Transactions, Vol. LIV.; and also at the end of these volumes.

As the activity of Mr. Pott's mind was equal to his zeal for the advancement of the art, whatever subject appeared to him to have been least considered, or most defectively treated by others, immediately became the object of his researches, and engaged his particular attention. The fistula in ano next attracted his notice. The nature of this complaint had been much mistaken, and the operations for its relief were consequently injudicious, horridly severe, and destructive of the parts they were intended to relieve. In

1765 he published a treatise on this subject. His method of reasoning on it is clear, ingenious, and conclusive; but they only can be judges of this inestimable work who have compared the simple operation which it recommends with those usually practised in similar cases in this kingdom, until the latter part of Mr. Pott's life, and even at the present time in other countries.

The observations and instructions which thus flowed from his ready pen, were enforced by his practice, and illustrated by oral communication; and he was happy to embrace every opportunity which his situation gave him, of conveying the information he had collected to those who had not the same means of acquiring it.

The humane and benevolent disposition of the people of this country is eminently displayed in the many charitable institutions which abound for the relief and protection of the poor, and in the ample support of them. The beneficial influence of hospitals is not shut up within their walls, nor confined to the objects who are there relieved; the bless-

ings which are there distributed revert to their opulent and noble supporters, and are extended to all ranks and conditions of men, by the improvements which the medical art receives from the students who frequent them. In a large hospital there must be opportunities of seeing the greatest possible variety of diseases, such as are either produced or increased by negligence and intemperance, added to those which are met with among the more prudent and better informed part of mankind. In short, all the multiform deviations from health and natural perfection are there, as in one large volume, collected and displayed. Of the advantages arising from such a collection, no person could be more sensible than Mr. Pott; but he also judiciously remarked, that young men often stood in need of an index to point out to them the proper objects for their attention and inquiry. To supply the deficiency, about this time he instituted a course of lectures, the first of which was given at his house in Watling-street. He had not then digested and arranged his ideas, but spoke, as I well remember, with hesitation

and reserve: yet even these his first essays bore strong marks of his comprehensive and penetrative mind. In a few courses he overcame all obstacles, and communicated his thoughts with eloquence and ease. He was not satisfied with following any system which had been laid down by others, as he thought they in general dwelt too much on the operative part, which, though very important, is by no means the most difficult part of surgery, nor the most worthy of attention. The means of preventing the necessity of operations, he observed, should be the first consideration; he therefore formed a plan of his own, the best, perhaps, which could be devised. He began with such general disorders as may affect any part of the human frame, and afterwards proceeded to consider the diseases of each part distinctly, beginning with the head, and descending to the inferior members. He took great pains on every point; and, having the art of being minute without tediousness, demonstrated it with clearness and precision. His manner gave importance to every subject, and impressed

his audience with the idea, that the art which he taught was worthy of their highest ambition. He not only explained the best modern practice with his own observations, but rendered the lecture still more curious and interesting, by a review of the practice of the ancients, and of the gradual progress of improvement which had taken place. This his extensive perusal of authors of all ages had made easy to him; for there was no time of his life when he thought so highly of himself as to imagine that he could receive no light from books. He often said, he began to teach when he had much to learn; and, as he was not actuated by that opinionative wisdom which sometimes attends advanced life, after all his study and experience he confessed, that he still retained a long list of *inquirenda*. His lectures were constantly attended by a numerous succession of pupils, and have been the means of very extensively disseminating much useful knowledge.

In 1768 he produced a new edition of his book on the Injuries to which the Head is liable from External Violence, accompanied

with what is entitled A Few General Remarks, but which is really a complete system on fractures and dislocations. This, I have been informed, he began and completed in a fortnight. The novelty of the doctrine contained in this treatise relates principally to the position of the injured limb. On its publication it met with some opposition, but has now subdued the first prejudices; and I believe I may venture to say, is become almost the universal practice.

The frequent avocations of Mr. Pott towards the west end of the town, where the buildings had prodigiously increased since he began life, making a more central situation necessary, in 1769 he purchased a house near Lincoln's-inn Fields, and resided in it seven years, during which time his pen was not inactive. The hydrocele again employed his thoughts. In 1772 he sent to the press his improved method of passing the seton, so as not to rub or injure the gland in its passage.

Mr. Pott took great pains with this subject, and never was perfectly satisfied with

what he had done in it. Various other methods have been employed for the cure of this complaint, and practitioners are still divided between them. I must confess that the curative intention does not seem well answered by either of them: they all appear to me to raise more inflammation, and to derange the economy of those tender and sensible parts more than is necessary. I have proposed another, which answers the purpose in a milder and better manner than any I have yet seen; and I feel a satisfaction in saying, that it met with Mr. Pott's approbation. One of our last conversations was on this subject; and, if his life had been prolonged, it was his intention to have practised it.

In 1775, Mr. Pott published Chirurgical Observations relative to the cataract, the polypus of the nose, the cancer of the scrotum, the different kinds of ruptures, and the mortification of the toes and feet, which were valuable additions to his former publications, and were marked with that spirit of observation,

perspicuity of reasoning, and candour in discussing controverted points, which distinguish his other productions.

In 1777 he removed to Hanover-square. Here, at an age when most men begin to think of ease and retirement, his active mind led him into a scene more busy and extensive than ever. Sir Cæsar Hawkins, who had long been employed in many of the first families, retired from London, which made no inconsiderable addition to Mr. Pott's former connexions. But, though engaged in business by day, and occupied at home in the evening, in answering letters addressed to him from all parts of Europe, I might say of the world, having seen many letters in which he was consulted on cases from America, Russia, Turkey, and India, as well as from our neighbouring kingdoms, he contrived to find time to add to his former works a treatise on the necessity of amputation in certain cases, in which he argues strongly in favour of truth and humanity, and clearly proves the rectitude of the principles which he has laid down. This seems principally to have

been written in answer to Mr. Bilguer, surgeon to the army of the late King of Prussia, who had published against the necessity of amputating in almost any case. The title of his book is, "De Membrorum Ampu-" tatione rarissimé administrandâ, aut quasi "abrogandâ;" and also, in reply to his commentator, Mr. Tissot, who wrote a treatise, "Sur l'Inutilité de l'Amputation des Membres," in which he goes even beyond his original, and absolutely sets aside the operation as useless; he speaks of it in the most opprobrious terms; he is shocked at the horror of it; exhorts surgeons to abandon the murderous and cruel method of amputation, with many other expressions equally misapplied. Such futile and absurd imputations can never confute what reason and experience have joined to demonstrate, that many lives have been saved by the operation, which would otherwise have been infallibly lost. However, as we must suppose that the doctrine which these gentlemen have promulgated arose from humane motives, and upon a conviction of its being well founded, we must

at least applaud their intention, though we cannot approve their judgment. But if it were possible that any man could be found capable of writing in defence and support of the unfeeling doctrine, that mutilated men are a burthen to the state, and that it is cheaper to enlist men than to cure them, such a work would deserve to be reprobated, and the author's name to be consigned to the detestation of posterity.

In 1779 Mr. Pott published his Remarks on that kind of palsy of the limbs which is frequently found to accompany a particular curvature of the spine. He introduced his first treatise on this subject with doubts and surmises, having just drawn the outline; but, finding his opinion confirmed by experience, he with confidence produced his further remarks on this disease, in 1783, in which he gives a complete description of the complaint, so little understood before, that those who suffered under it were consigned to their fate, which usually led to inactivity, deformity, and death. In this valuable tract he lays down a very accurate dis-

crimination of this from every other species of paralysis, and proposes a new and most efficacious method of stopping its progress, and curing it.

This was the last of his literary productions: the mode of cure which he recommends in it he afterwards applied to diseases of the hip-joint, with considerable success. If his life had fortunately been prolonged, it was his intention to publish his opinions on this subject. At the same time, I have great reason to think he would have added an account of those very painful excrescences which are frequently the consequence of long-neglected piles. He had been remarkably successful in the treatment of this afflicting complaint, and thought the disease itself not sufficiently understood, nor the mode by which he succeeded commonly practised; but, as it was not his custom to begin to write on any subject till he was prepared to finish it, it is to be lamented that his ideas on these and some other important points were not committed to paper. As Mr. Pott conceived these subjects to be of so much importance, I

cannot pass them over in silence, though I much regret that they have not been laid before the public in his comprehensive manner[d].

The time now began to approach when Mr. Pott may be said to have attained the summit of that eminence which he owed to himself alone. Though unadorned with any honorary distinction in the profession, he was sought after and employed by persons in the first degree of rank and power; and though he solicited neither honours nor favours for himself, he often successfully employed his influence on behalf of others. He was universally consulted; practitioners referred to him in cases of uncommon difficulty and danger, as their last resource; his extensive experience, and his ready application of it, rendered that easy to him, which, to most other men, would have been a painful pre-eminence.

The Royal College of Surgeons in Edinburgh were not inattentive to his deserts. In 1786 he received a diploma, accompanied by a letter expressive of the sense they entertained of them: the value of the honour was greatly enhanced

[d] Vide Vol. III.

by his being the first person on whom they had thought proper to bestow it[e].

In the following year the Royal College of Surgeons in Ireland presented him with their freedom, in a silver box[f].

[e] (COPY.)

"SIR, *Edinburgh, Aug.* 1, 1786.

"It is with peculiar pleasure I obey the commands of the Royal College of Surgeons in acquainting you, that they have this day unanimously elected you an Honorary Fellow of the Royal College of Surgeons of Edinburgh, a compliment which they think your very distinguished merit justly entitled to.

"May I add, as an additional mark of the College's respect, that you are the first Gentleman of the Faculty they have thought proper to bestow the honour on.

"I have the honour to be, &c.

"THOMAS HAY, President."

[f] (COPY.)

"HONORARY DIPLOMA

"*Voted to* PERCIVALL POTT, Esq. *Sept. 9th, 1787, by the Royal College of Surgeons in Ireland.*

"Whereas it has appeared to us, in full College duly assembled, that Percivall Pott, Esq. has eminently distinguished himself in the science of surgery; now, we being desirous to manifest our approbation of conspicuous merit, do, by virtue of the powers vested in us by his majesty's

In July 1787 he resigned the office of Surgeon to St. Bartholomew's hospital, after having served it, as he used to say, man and boy, half a century. On the day of his resignation, the annual meeting of the governors was held, and they dined in the great room of the hospital: when he was about to retire, the Right Honourable Thomas Harley, president, proposed a health to Mr. Pott, with many thanks for his long, able, and faithful services to that house; which was received with reiterated bursts of applause. Mr. Pott's usual readiness forsook him on this trying occasion: after repeatedly rising to thank the assembly for the compliment they had paid him, he felt himself obliged to sit down in silence. His resolution and presence of mind, though not easily overcome, were not proof against the powerful emotions excited by this public and unexpected testimony of his having acted well,

royal charter, by these presents, elect, constitute, and appoint, the said P. Pott an Honorary Member of this College, with all the privileges, dignities, and immunities thereunto annexed.

(Signed)

" J. WHITEWAY, President."

and filled an important station to the advantage of mankind.

It is possible that some of the greatest blessings we enjoy, may, by a fortuitous concatenation of events, tend to shorten their own existence. Thus it seemed in the case of Mr. Pott, whose remarkable temperance had ensured him so long a continuance of health and spirits, that he was deceived in himself. Had he been subject to some of the infirmities which usually attend people of his age, as he must necessarily have paid more attention to his general health, his days might possibly have been prolonged. Though he was free from any particular complaint, and his constitution was sound, still it sustained the weight of more than threescore years and ten! to this his mind, busy and cheerful as ever, would not permit him to advert. It is painful to relate, that, in the full possession of his faculties, with a frame of body apparently calculated to last much longer, he fell a sacrifice to his own active disposition, and inattention to the first attack of his disorder.

On Thursday, 11th December, 1788, he

went, in very severe weather, to visit a patient about twenty miles from London: when he returned, he complained that he had caught cold. The next day he lay in bed, a circumstance very uncommon to him; the following day, thinking himself better, he would not submit to the regimen which had been recommended, but went out as usual; the day after (Sunday, the 14th) the cold was remarkably intense, and it being necessary to repeat the visit in the country, I was happy to save him so inclement a journey; but, at my return, was informed that he had been a round of visits in town, and was just got home, perceiving himself unable to complete his list. A shivering soon seized him, and he went to bed; a fever succeeded, and before night he grew delirious. He passed great part of the night in this state: the next morning, on my asking how he found himself, after a short apparent struggle for recollection, the words of his answer precisely were;—"My mind has great propensity to "aberration; and I find myself much in-"clined to talk nonsense, unless I studiously

" collect my thoughts, and fix them."—Through the whole of his illness, during the intervals of reason, his observations on many subjects were remarkably sensible and pointed; and he seemed particularly attentive to correctness in his language. The description of the pain he felt was anatomically exact. He did not appear to doubt of his recovery during several days, though the fever continued, with unremitting violence, in opposition to the best medical assistance, being attended with the most affectionate assiduity, by the late Dr. Heberden, Sir Francis Millman, and the late Dr. Austin. His head became rather more clear as the disorder advanced, and he seemed more sensible of his danger; on the seventh day he observed, " My lamp is almost extinguished; " I hope it has burned for the benefit of " others." On the following day, the 22d of December, he expired.

His remains were attended by many of his relations and friends to Aldermary church in Bow-lane, where they were deposited near those of his beloved mother.

On a marble tablet affixed to the wall is the following inscription, by his son the Reverend Joseph Holden Pott, A. M. Archdeacon of St. Alban's, &c.

In Memory
OF PERCIVALL POTT, Esq. F. R. S.

Surgeon of St. Bartholomew's Hospital during Forty-two Years,
Who departed this Life, December 22d, 1788, aged 75.

He was
Singularly eminent in his Profession,
To which he added many new Resources, and which he illustrated
With matchless Writings.
Let Posterity revolve the Sum of his Experience,
That the World may still enjoy the Benefit of his
Successful Practice.
He honoured the collective Wisdom of past Ages:
The Labours of the Ancients were familiar to him:
He scorned to teach a Science of which he had not traced the growth;
He rose, therefore, from the Form to the Chair.
Learn, Reader, that the painful Scholar can alone become
The Faithful Teacher.
But his studies had a double Issue:
Whilst he gathered the Knowledge of his Predecessors,
He perceived their Errors, and corrected them;
He discovered their Defects, and supplied them.
Original in Genius, prompt in Judgment, rapid in Decision,
He directed Knowledge to its proper Ends;
But pursued them when the Aids of Information were exhausted;
The last Steps, therefore, and great Improvements,
Were his own.

His integrity is before his Judge;
Without it, his Skill might have profited Mankind,
But could have claimed no Record within these Walls.

His private Virtues,
His signal Tenderness to his Family,
Completed an Example,
Amiable, Useful, Great.

THE genius of Mr. Pott, however, assisted by art, was certainly of the first order by nature, as appears by the variety and perfection of his attainments. He was the most eminent of his time as a writer, as a teacher, and as a practitioner in surgery; and his merits in each of these characters were most extensive. Possessed with an enthusiastic love of excelling, without which genius is inert, he was not contented with any kind of mediocrity in himself.

As an author, his language is correct, strong, and animated. There are few instances, if any, of such classical elegance, united with so much profound scientifical acuteness. In his surgical inquiries he studiously avoided reference to obscure and general principles; he preferred reasoning by analogy and induction from established facts; a method certainly more safe and more accommodated to the present state of physiological knowledge. He introduces anatomy and physiology, whenever it is necessary, to illustrate and distinguish diseases; but never confuses his reader with uncertain hypotheses in

pathology, founded on physiological principles. He was of opinion, and it is the opinion of Newton, that hypothesis has no place in any physical science. To place the disease in a distinct point of view; to demonstrate wherein it consisted, and the changes which must be effected to remove it; to point out the remedies which would most safely and certainly produce those changes, were the objects to which he directed his whole attention. His remedies always strongly marked his intention; they were decided and consistent; and he was the principal author of that simplicity which distinguishes the present practice from that of our ancestors. With these views he applied himself to every part of the surgical art, and improved both the pathology and cure of many diseases. His treatment of fistulous sores, and his history and cure of the caries of the corpora vertebrarum, were perhaps his greatest works: but his improvements, as we have seen, extended to many other subjects; and his researches introduced such novelties in the practice of surgery, that his life must ever be considered as a great epoch in the history of that art.

As a teacher, he had acquired the faculty of speaking readily, with great point and energy, of delivering the most prolix and intricate sentences with incredible perspicuity and correctness, and of enforcing what he said with a most harmonious and expressive elocution. He allowed no excuse for defects in himself; he always avowed that excellent maxim,—

> ————Cui lecta potenter erit res,
> Nec facundia deseret hunc, nec lucidus ordo.

As a practitioner in surgery, we must apply to him all the essential qualifications, sound judgment, cool determination, and great manual dexterity. He had seen much of practice, and what he had seen he had digested, by reading, writing, and lecturing on those subjects.

In the transaction of business there was a freedom and openness in his manner, which evidently arose from a consciousness that the opinion which he delivered was founded on experience. In every instance he shunned affectation and singularity; and his conduct in all situations was an appeal to the good sense of mankind. Thus he acquired the universal confidence of the

profession; and, without any accidental or external help, he raised himself to the greatest dignity which man can attain — the first rank in a liberal profession.

DOMESTIC virtues make no great figure in history; yet the domestic virtues of distinguished men should not be forgotten, because they promote the cause of virtue; besides, great and amiable qualities reflect lustre on each other. The ambition, the industry, and enterprise of Mr. Pott, did at no time interfere with the duties of a husband and a father. Though his ready wit and brilliant conversation, abounding with interesting anecdotes of his own observation, and with happy quotations from modern and ancient authors, rendered him a conspicuous character in all parties, he was most happy, and not less to be admired in the circle of his family. In their society, he spent much the greater part of his leisure hours, and in such a manner as to be the object of the utmost affection and veneration to a

numerous offspring of children and grandchildren.

The person of Mr. Pott was elegant, though lower than the middle size; his countenance animated and expressive; his manners and deportment were graceful; and his remarkable vigour and activity seemed unabated by age.

The labours of the greatest part of his life were without relaxation;—an increasing family required his utmost exertion. Of late years he had a villa at Neasden; and in the autumn usually passed a month at Bath, or at the sea-side. Thus, though he gathered, as he expressed it, some of the fruit of the garden which he had planted as he went along, and always lived in a generous and hospitable manner, at the same time bestowing on four sons and four daughters a liberal and necessarily expensive education, and applying large sums to their establishment during his life-time, he left an ample provision for them at his decease. Among his papers was found, what he had often mentioned, a small box, containing a few pieces of

money*, being the whole which he ever received from the wreck of his father's fortune. With this was deposited an exact account of every individual fee which a long life of business had produced—abundant evidence of well-spent time, and the industrious application of abilities, to which the *res angusta domi*, at the commencement, probably acted more powerfully as an incentive than as an obstacle.

J. E.

Hanover-Square,
January 1st, 1808.

* Under 5*l.*

OBSERVATIONS

ON THE

NATURE AND CONSEQUENCES

OF THOSE

INJURIES

TO WHICH

THE HEAD IS LIABLE

FROM

EXTERNAL VIOLENCE.

SECT. I.

WOUNDS OF THE SCALP.

PREVIOUS to an account of such wounds and injuries of the head as interest the scull, the brain, and its membranes, it may not be amiss to take some small notice of those to which the scalp is liable. Though this be called the common tegument of the head, yet, from the variety of parts of which it is composed, from their structure, connexions, and uses, injuries done to it by external violence become of much more consequence than the same kind of ills can prove when inflicted on the common teguments of the rest of the body.

The covering, called the scalp, consists of the cutis, the membrana adiposa, or cellularis, the expanded tendons of the frontal, occipital, and temporal muscles (forming a kind of aponeurosis), and the membrane which immediately covers the bones of the scull, called therefore the pericranium.

This variety of parts, upon the infliction of wounds, blows, &c., frequently occasions a variety of symptoms; which symptoms ought by practitioners to be carefully and properly distinguished

from each other; not only because they often arise from the distinct and particular nature of the part injured, but because they generally point out the most effectual means of relief. If to these considerations we add another, no less true and important, (viz.) that there is and must be a constant communication, by means of blood-vessels, between all the parts without and within the head, it will appear, that injuries done to this part, though seemingly, and at first sight, slight and trivial, may sometimes prove of the greatest consequence.

I will not waste the reader's time, by entering into a detail of the method of treating common incised wounds; but proceed immediately to those which, though the mischief be originally confined to the mere scalp, yet are frequently very terrible to behold, are often attended with alarming symptoms, and sometimes with danger. These are what are called lacerated wounds, and those made by puncture. The former may be reduced to two kinds, (viz.) those in which the scalp, though torn, or unequally divided, still keeps its natural situations, and is not stripped or separated from the cranium to any considerable distance beyond the breadth of the wound; and those, in which it is considerably detached from the parts it ought to cover.

The first of these, if simple, and not combined with the symptoms or appearances of any other mischief, do not require any particular or different treatment from what the same kind of wounds require on all other parts; but the latter,

(those in which the scalp is separated and detached from the parts it ought to cover,) are not only, by the different methods in which they may be treated, frequently capable of being cured with a considerable deal more or less ease and expedition, but prove also sometimes matter of great consequence to the health and well-being of the patient. Both writers and practitioners differ much in their advice and conduct on this subject. With some it is a practice immediately to remove such portion of the scalp as is fairly and perfectly detached from the parts underneath; with others, to attempt its preservation.

Each of these opinions can be considered, in a general sense only, not as applicable to every individual case without distinction; and taken in such general consideration, they cannot be both right. It may therefore be worth while to inquire, what reasons each party has to give for its opinion and conduct.

They who advise the removal, affirm, that when a large portion of the scalp has been perfectly and totally separated from the parts it ought to cover, and that for some considerable space, it will not again coalesce or unite with such parts; and therefore that an attempt to procure such union, by replacing the separated piece, will only protract the time of cure, by furnishing a lodgement for matter and sloughs, which matter and sloughs must prevent the thing intended. That in case of large wounds, or of those produced by great force, as we can-

not by any means be absolutely certain that no mischief is done to the parts under the cranium, the replacing the lacerated scalp may not only prevent our immediate inquiry into the nature of such mischief, but may conceal and hide (at least for a time) such future appearances as might furnish indications to direct a surgeon's conduct.

They who advise the preservation of the separated scalp[a], do it upon a supposition, that it will in general unite again; that if it do, the patient may thereby be spared a great deal of pain, save much time, and sustain much less deformity; that with regard to the immediate inquiry into the state of the cranium, it may be made before the scalp is replaced; that if there be no present symptoms which indicate injury done to the parts underneath, it would be absurd to act merely upon the presumption that there may be some in future; that it will be more proper and vindicable to do what is right at first, or according to the present circumstance, and to attend to what *may* happen or occur hereafter, when such occurrences have happened; and that the formation of matter and sloughs, under the detached and replaced portion, will not, in general, under proper management, prevent its re-union.

[a] I presume I need not observe, that when I say *separated*, I mean only with regard to the inferior surface of such piece, and that it is still contiguous with some part of the skin.

It is to be presumed, that every practitioner wishes to cure his patients as soon as he can, by the least painful means, and in such manner as shall be productive of the least possible deformity or defect; taking care at the same time, not to be inattentive to any evil which may arise, nor to omit or neglect doing whatever may be necessary during such cure.

Upon this principle, I make no scruple of declaring it as my opinion, that the preservation of the scalp ought always to be attempted, unless it be so torn as to be absolutely spoiled, or there are manifest present symptoms of other mischief. This kind of wound is sometimes very terrible to look upon, and they who have not been accustomed to see it, may be inclined to think there is no remedy but excision: but I have so often made the experiment of endeavouring to preserve the torn piece, and have so often succeeded, that I would recommend it as a thing always to be attempted, even though a part of the cranium should be perfectly bare, unless the two circumstances already mentioned render it improper or impracticable. The removal of it necessarily produces a larger sore, which must require a good deal of time to heal, and must leave a considerable deformity: the preservation of it prevents both.

Therefore, when such case occurs, let the surgeon be particularly careful to examine, whether there be any appearances, or symptoms, of any other kind of mischief beside what the scalp has sustained; and if there be neither, let him make

the torn piece clean from all dirt, or foreign bodies, and restore it quickly, and as perfectly as he can, to its natural situation[b].

[b] The distance from the place where the accident happens, and other causes, frequently prevent the surgeon from examining the wound, until a considerable time has elapsed, when, without any application having been made to it, the surface of the torn scalp, and the parts which adhere to the cranium, are become dry, and are apparently not in a state to heal by the first intention; or some dressings may have been applied, which, by the nature of them, and by keeping the parts separate, add to the indisposition to unite. In either of these cases, notwithstanding many hours may have intervened, this excellent idea of saving the scalp need not be abandoned; on the contrary, after the wound has been thoroughly washed and cleansed, the surfaces of it should be lightly scarified with the point of a lancet; when, being thus refreshed, and yielding a small effusion of blood, the immediate union between them will probably take place, provided they are brought into contact, and retained as Mr. Pott directs.—To explain my meaning, I will select the following instance: A gentleman, about twenty years old, thrown from his horse, and entangled in the stirrup, received a kick on the forehead. As he was at a great distance from London, I did not see him till forty hours after the accident: he had been, and still continued, in a state of insensibility: the horse's shoe had struck him on the edge of the orbit, and had torn the eye-brow and nearly one half of the covering of the forehead, which was raised, and formed a flap. The wound, which was very large, had been filled, soon after the accident, with lint: it immediately occurred to me, that, if it were suffered to heal in this situation, the consequent deformity must be deplorable. I therefore removed the dressings, and found the os frontis denuded in two places: there was no fracture, except of a small portion of bone, which had been broken off from the edge of the orbit, and his symptoms were those of general concussion. I conceived it would be right to endeavour to procure an union of the separated parts, though from the length of time since

The manner in which it is to be there maintained, must a good deal depend upon the

they had been divided, and from the dressings, which had left the fibres dry and constringed, they appeared very ill disposed to unite. However, after having got rid of the remainder of the lint, and made it perfectly clean with warm water, I scarified the whole internal surface of the detached scalp, and the parts of the muscle which still adhered to the bone, which his absence of perception enabled me to perform freely. I then brought them into contact, and retained them in that situation by the dry suture. I had the satisfaction to find them unite by the first intention, making a simple line nearly down the middle of the forehead. By proper treatment he soon regained his senses; and a small exfoliation from the edge of the orbit, at the bottom of the wound, was the only circumstance which for some time retarded the perfect cure.

I will mention another case in which very different treatment, but equally wrong, had taken place before I saw the patient: —

A man sitting on the shafts of a loaded waggon fell down in a fit: as he lay on his face, the wheel passed over the right side of the head, tore off the whole of the scalp from the parietal and temporal bones, and from part of the frontal bone. The integuments also which covered the under part of the orbit and cheek were much torn and bruised: in short, a more completely mangled and shocking object can scarcely be imagined.

The whole of this large wound I found covered with a soft greasy poultice. On taking it off, though the wound had been in some measure washed and cleansed, the remaining mud mixed with blood presented the appearance of a dirty quagmire, in which the wounded portions were loose and floating, but still retained some connexion with the neighbouring parts. The poultice had been applied all night, and part of the day. It is evident at first sight that the consequence of the continuance of such application must be the sloughing and destruction of all these parts; and if life were preserved, the poor sufferer must remain a miserable object. I therefore ordered

particular circumstances of each individual case, and therefore must be left to the surgeon, who will make use of plaister, bandage, and suture, together or separately, as he shall find them most convenient, and best fitted to the purpose.

it to be well cleansed in every part with warm water, the doing of which completely was not an easy task. When this was thoroughly accomplished, I scarified freely every part of the wound over the whole surface of the parts which still adhered to the bones, as well as the inside of the torn portions of scalp, which though so ragged, so torn to shreds and tatters that I thought it impossible that they should all unite, I would not suffer to be removed, but gave them all a chance, thinking that those parts which should die from want of circulation, might easily be taken away at some future opportunity. I then brought all the parts as nearly as possible into their natural situation, and retained them by means of ligatures, strips of sticking plaister, and bandages lightly applied.

Some blood was taken from the arm, which, with open bowels and a low diet, prevented considerable inflammation from coming on. From day to day such strips of sticking plaister as were loose were removed, and others applied. In the progress of a few days I was agreeably surprised to see that in general an union had taken place, except on the sides of some of the smaller portions of the detached scalp, and the extremities of others which remained black and lifeless, and which of course were taken away; and particularly there was a small portion under the eye, which being dead for want of a nourishing vessel, sloughed and came away and threatened a considerable disfigurement. The loss however was greatly remedied by bringing the neighbouring parts as nearly together as possible. In no great length of time the whole wound was healed, when all those who had witnessed the accident and observed its progress toward amendment, as well as myself, were astonished at the little scar or deformity left from so extensive and complicated a wound.

I may add, that the man, before the accident, had been reckoned handsome, and the front view of his face afterward still retained its comely appearance. E.

I am aware that the very mention of a suture in a wound of the scalp, particularly a lacerated one, will startle some of my readers, who have been taught that it is always wrong in both; I know that this is the general doctrine, but I know also, that although it be sometimes true, yet if it be implicitly adhered to, it will prevent a practitioner now and then from receiving very useful assistance. A stitch, made with a slip-not, will sometimes hold the divided parts in such situation, as will greatly expedite a cure: in many cases a very short time will answer the end, and the thread may be removed as soon as ever the purpose is accomplished, or the suture becomes either improper or useless.

In some cases this will be all that is required; the loosened scalp will unite with the parts from which it was torn and separated, and there will be no other sore, than what arises from the impracticability of bringing the lips of the wound into smooth and immediate contact, the scar of which sore must be small in proportion.

On the other hand, it sometimes happens that such perfect re-union is not to be obtained; in which case, matter will be formed and collected in those places where the parts do not coalesce: but this does not necessarily make any difference, either in the general intention, or in the event: this matter may easily be discharged, by one or two small openings made with a lancet; the head will still preserve its natural covering; and the cure will be very little retarded by a few small abscesses.

I must desire not to be misunderstood: I do not mean to say, that it must be always and invariably right, to return the loosened scalp, and to endeavour to procure its immediate re-union, or that such attempt will always succeed; I only mean to signify, that it is my opinion, (and that founded on experience) that the mere separation or detachment of the scalp, to however large an extent, is not a good and sufficient reason for cutting off any part of it in cases where no other mischief seems to have been done, in which the cranium in uninjured, and the parts within it unhurt; and, that the attempt to procure a re-union with the parts from which it was separated, though it will sometimes fail, yet will most frequently succeed; and is always worth making; as such experiment, properly made, can never be attended with any real inconveniences.

In some cases, the whole separated piece will (as I have said before) unite perfectly, and give little or no trouble, especially in young and healthy persons; in some, the union will take place in some parts, and not in others; and consequently matter will be formed, and require to be discharged, perhaps at several different points; and in some particular cases, circumstances, and habits, there will be no union at all: the torn cellular membrane, or the naked aponeurosis, will inflame and become sloughy, a considerable quantity of matter will be collected, and perhaps the cranium will be denuded: but even in this state of things, which does not very often happen where proper care has been taken,

and is almost the worst which can happen in the case of mere simple laceration and detachment, I say, even in this, if the surgeon will not be too soon, nor too much alarmed, nor in a hurry to cut, he will often find the cure much more feasible than he may at first imagine: let him take care to keep the inflammation under by proper means; let him have patience till the matter is fairly and fully formed, and the sloughs perfectly separated; and when this is accomplished, let him make a proper number of dependant openings for the discharge of them; and let him by bandage, and other proper management, keep the parts in constant contact with each other, and he will often find, that although he was foiled in his first intention, of procuring immediate union, yet he will frequently succeed in this his second; he will still save the scalp, shorten the cure, and prevent the great deformity arising (particularly to women), not only from the scar, but from the total loss of hair.

I have said, that this union may often be procured, even though the cranium should have been perfectly denuded by the accident; and it is true, not only though it should have been stripped of its pericranium at first, but even if that pericranium should have become sloughy and cast off, as I have often seen.

Exfoliation from a cranium laid bare by external violence, and to which no other injury has been done than merely stripping it of its covering, is a circumstance which would not so often happen, if it were not taken for granted that it

must be, and the bone treated according to such expectation: the soft open texture of the bones of children and young people will frequently furnish an incarnation, which will cover their surface, and render exfoliation quite unnecessary; and even in those of mature age, and in whom the bones are still harder, exfoliation is full as often the effect of art, as the intention of nature, and produced by a method of dressing, calculated to accomplish such end, under a supposition of its being necessary. Sometimes indeed it happens that a small scale will necessarily separate, and the sore cannot be perfectly healed till such separation has been made: but this kind of exfoliation will be very small and thin, in proportion to that produced by art, which is, that produced by dressing the surface of the bare bone with spirituous tinctures, &c.; and when a wound on the head, with a sound uninjured bone, denuded by accident, shews a disposition to heal without exfoliation, it never can be right to counteract nature, and oblige her to do that she is not inclined to, and which she would otherwise accomplish better.

If the scalp be detached by such means, or with such force of instrument, that the scull or parts within it have suffered, then the immediate union of the skin becomes impracticable, and it would be highly injudicious to attempt it: our attention then must be paid to the greater evil; it then becomes another kind of case, and all that need be said of it in this place is, that although such mischief do generally require the removal of

some part, yet even in this situation, no more of it should be cut off than what will be necessary for the detection and proper treatment of such mischief. In short, whether considered as skin, or as the seat of the hair, it ought never to be removed wantonly, or without absolute necessity.

Small wounds, that is, such as are made by instruments, or bodies which pierce or puncture rather than cut, are in general more apt to become inflamed, and to give trouble, than those which are larger; and in this part particularly are sometimes attended with so high inflammation and with such symptoms, as alarm both patient and surgeon.

The parts capable of being hurt by such kind of wound, are the skin, the tela cellulosa, the the expanded tendons of the muscles of the scalp, and the pericranium.

If the wound be no deeper than the cellular membrane and has not reached the aponeurosis or pericranium, the inflammation and tumour affect the whole head and face, the skin of which wears a yellowish cast, and is sometimes thick set with small blisters, containing the same coloured serum; it receives the impression of the fingers, and becomes pale for a moment, but returns immediately to its inflamed colour; it is not very painful to the touch, and the eye-lids and ears are always comprehended in the tumefaction, the former of which are sometimes so distended, as to be closed; a feverish heat and thirst generally accompany it; the patient is

restless, has a quick pulse, and most commonly a nausea, and inclination to vomit.

This accident generally happens to persons of bilious habit, and is indeed an inflammation of the erysipelatous kind; it is somewhat alarming to look at, but it is not often attended with danger. The wound does indeed neither look well, nor yield a kindly discharge, while the fever continues, but still it has nothing threatening in its appearance, none of that look which bespeaks internal mischief; the scalp continues to adhere firmly to the scull, and the patient does not complain of that tensive pain, nor is afflicted with that fatiguing restlessness which generally attends mischief underneath the cranium.

Phlebotomy, lenient purges, and the use of the common febrifuge medicines, particularly those of the neutral kind, generally remove it in a short time. When the inflammation is gone off, it leaves on the skin a yellowish tint, and a dry scurf, which continue until perspiration carries them away, and upon the disappearance of the disease, the wound immediately recovers a healthy aspect, and soon heals without any further trouble.

Wounds and contusions of the head, which affect the brain and its membranes, are also subject to an erysipelatous kind of swelling and inflammation; but it is very different, both in its character and consequences, from the preceding.

In this (which is one of the effects of inflammation of the meninges) the febrile symptoms are much higher, the pulse harder and more frequent,

the anxiety and restlessness extremely fatiguing, the pain in the head intense; and as this kind of appearance is, in these circumstances, most frequently the immediate precursor of matter forming between the scull and dura mater, it is generally attended with irregular shiverings, which are not followed by a critical sweat, nor afford any relief to the patient. To which it may be added, that in the former case the erysipelas generally appears within the first three or four days; whereas in the latter, it seldom comes on till several days after the accident, when the symptomatic fever is got to some height. In the simple erysipelas, although the wound be crude and undigested, yet it has no other mark of mischief; the pericranium adheres firmly to the scull, and, upon the cessation of the fever, all appearances become immediately favourable. In that which accompanies injury done to the parts underneath, the wound not only has a spongy, glassy, unhealthy aspect, but the pericranium in its neighbourhood separates spontaneously from the bone, and quits all cohesion with it. In short, one is an accident, proceeding from a bilious habit, and not indicating any mischief beyond itself; the other is a symptom, or a part of a disease, which is occasioned by injury done to the membranes of the brain; one portends little or no ill to the patient, and almost always ends well; the other implies great hazard, and most commonly ends fatally. It is therefore hardly necessary to say, that it behoves every practitioner to

be careful in distinguishing them from each other.

If the wound be a small one, and has passed through the tela cellulosa, to the aponeurosis, and pericranium, it is sometimes attended with very disagreeable, and even very alarming symptoms, but which arise from a different cause, and are very distinguishable from what has been yet mentioned.

In this, the inflamed scalp does not rise into that degree of tumefaction, as in the erysipelas; neither does it pit, or retain the impression of the fingers of an examiner: it is of a deep red colour, unmixed with the yellow tint of the erysipelas: it appears tense, and is extremely painful to the touch. As it is not an affection of the tela cellulosa, and as the ears and the eye-lids are not covered by the parts in which the wound is inflicted, they are seldom, if ever, comprehended in the tumour, though they may partake of the general inflammation of the skin: it is generally attended with acute pain in the head, and such a degree of fever as prevents sleep, and sometimes brings on a delirium [c].

[c] In the last lecture which Mr. Pott gave on this subject, he candidly observed, that he found he had drawn the line of distinction between those wounds by which the tela cellulosa alone is hurt, and those which penetrate through and puncture the aponeurosis and pericranium, too decidedly, and said he was convinced, that the different symptoms which he had sup-

A patient in these circumstances will admit more free evacuations by phlebotomy, than one labouring under an erysipelas: the use of warm fomentation is required in both, in order to keep the skin clean and perspirable, but an emollient cataplasm, which is generally forbid in the former, may in this latter case be used to great advantage.

When the symptoms are not very pressing, nor the habit very inflammable, this method will prove sufficient: but it sometimes happens, that the scalp is so tense, the pain so great, and the symptomatic fever so high, that by waiting for the slow effect of such means, the patient runs a risque from the continuance of the fever; or else the injured aponeurosis and pericranium becoming sloughy, produce an abscess, and render the case both tedious and troublesome. A division of the wounded part by a simple incision down to the bone, about half an inch or an inch in length, will most commonly remove all the bad symptoms, and if it be done in time, will render every thing else unnecessary.

posed to follow the wound of this or that part, often arose from the constitution and habit of the person wounded, rather than from the nature of the accident, and that the consequences could not always be deducible from the particular part which had received the injury; for that, since he had written on the subject, he had remarked the same symptoms indiscriminately arising from either kind of wound. E.

THE injuries to which the scalp is liable from contusion, or the appearances produced in it by such general cause, may for method-sake be divided into two classes, viz. those in which the mischief is confined merely to the scalp, and those in which other parts are interested.

The former, which only comes under our present consideration, is not indeed of importance, considered abstractedly. The tumour attending it is either very easily dissipated, or the extravasated blood causing it, is easily got rid of by a small opening. I should not therefore have thought it of such consequence, as to be worth mentioning in this place, had it not been for an accidental circumstance, which sometimes attends it, and renders it liable to be very much mistaken.

When the scalp receives a very smart blow, it often happens that a quantity of extravasated blood immediately forms a tumour, easily distinguishable from all others, and generally very easily cured. But it also sometimes happens, that this kind of tumour produces to the fingers of an unadvised or inattentive examiner, a sensation, so like to that of a fracture, with depression of the cranium, as may be easily mistaken. Now, if upon such supposition, a surgeon immediately removes the tumid scalp, he may give his patient a great deal of unnecessary pain, and for that reason run some risque of his own character.

The touch is, in this case, so liable to deception,

that recourse should always be had to other circumstances and symptoms, before an opinion be given.

If a person, with such tumour occasioned by a blow, and attended with such appearances and feel, have any complaint, which seems to be the effect of pressure made on the brain and nerves, or of any mischief done to the parts within the cranium; the division or removal of the scalp, in order to inquire into the state of the scull, is right and necessary; but if there be no such general symptoms, and the patient be in every respect perfectly well, the mere feel of something like a fracture will not authorise or vindicate such operation, since it will often be found, that such sensation is a deception, and that when the extravasated fluid is removed, or dissipated, the cranium is perfectly sound and uninjured.

The second kind of tumour attending the contused scalp, viz. that which arises from injury done to the cranium, and parts within, does so absolutely proceed from, and depend upon such injury, as not to fall under our consideration in this place at all, but will be considered at large when we come to speak of the mischiefs done to the scull and brain by collision, or contusion.

From what has been said it appears, that the scalp, taken in a general sense, is, when wounded or bruised, liable to be affected with four kinds of tumour, each of which has a distinct cause, and requires, or permits, a different method of treatment.

The first does not imply any injury done to

the parts within the scull, requires no operation; and almost always is cured by general remedies.

The second, or that which is caused by the spontaneous separation of the pericranium from the scull, in consequence of internal mischief, is not at first attended with very pressing symptoms; but whoever has observed their progress, and attended to their event, must know what fatal and frequently irresistible evil it is the forerunner of, nothing less than the inflammation and putrefaction of the membranes of the brain, and the formation of matter between them and the scull; and that it is a case which, of all others, will least admit delay.

The third, though it sometimes gives way to free evacuation, and lenient external applications, yet is sometimes also attended with symptoms which are too pressing to wait the effect of such remedies, and is capable of being immediately relieved by a division of the inflamed and irritated parts; whereas the same incision, made into the first kind of tumefaction, would most probably exasperate the disease, and heighten the symptoms.

The fourth, consisting of extravasated blood, seldom requires any chirurgic operation; time, and the use of the common discutient applications[d], almost always dissipate it; and it only becomes of consequence by the possibility of its being misunderstood and mis-treated.

[d] Among which I know of none equal to a solution of crude fal almon. in vinegar and water, or spt. vin.

SECT. II.

EFFECTS OF CONTUSION ON THE DURA MATER, AND PARTS WITHIN THE SCULL.

In order to understand rightly, and to have a clear idea of this kind of injury, it is necessary to recollect, that the vessels of the pericranium, those of the diploe, or medullary substance between the two tables of some parts of the cranium, and those of the dura mater within it, do all constantly and freely communicate with each other; and that this communication is carried on by means of innumerable foramina, found in all parts of both surfaces of the scull, as well as at the sutures; that upon the freedom of this communication depends the healthy and sound state of all the parts concerned in it; and that from the interruption or destruction of this proceed most of the symptoms attending violent contusions of the head, extravasations of fluid between the cranium and dura mater, inflammations of the said membrane, and simple undepressed fracture of the scull.

The pericranium is so firmly attached to the outer surface of the scull, as not to be separable from it without considerable violence; and when such violent separation is made in a living subject (especially if young) the cranium is always seen to bleed freely, from an infinite number

of small foramina. The dura mater, which is a firm strong membrane, is almost as intimately attached to the inside of the scull, as the pericranium is to the outside, and by the same means, viz. by vessels; and by these means a constant circulation and communication are preserved and maintained between the two membranes and the bones dividing them. This, all the appearances which attend the scalping a living person, or the separation of the scull from the dura mater of a dead one (especially if such person died apoplectic, or was hanged), prove beyond all doubt: in the former, the blood will (as I have already observed) be seen issuing from every point of the surface of the cranium; in the latter, not only a considerable degree of force will be found necessary to detach the sawed bone from the subjacent membrane, but when it is removed, a great number of bloody points will be seen all over the surface of the latter; which points, if wiped clean, do immediately become bloody again, being only the extremities of broken vessels. These vessels are largest at, and about the sutures, at which places the adhesion is the strongest, and the hæmorrhage upon separation the greatest.

It has been thought by many, that the dura mater was attached to the scull, only at the sutures; that in all other parts it was loose and and unconnected with it; and that it constantly enjoyed or perfo med an oscillatory kind of motion, and was alternately elevated and depressed. This idea and opinion were borrowed from the

appearance which the dura mater makes in a living subject after a portion of the scull has been removed: but although it has been inculcated by writers of great eminence, yet it has no foundation in truth or nature, and has misled many practitioners in their opinions, not only of the structure and disposition of this membrane, but in their idea of its diseases.

The dura mater performs on the internal surface of the bones of the cranium, the office of periosteum, in the same manner as the pericranium does on the external; (at least they have no other:) to this it is so firmly and so generally attached, as to be incapable of any, even the smallest degree of motion. The alternate elevation and subsidence of it, which are observable when any portion of it is laid bare, are owing to a very different cause from any power in itself; neither is, nor can ever be performed, until a piece of the cranium has been forcibly taken away; and consequently cannot possibly be natural, or necessary.

By blows, falls, and other shocks, some of the larger of those vessels which carry on this communication between the dura mater and the scull are broken, and a quantity of blood is shed upon the surface of that membrane. This is one species of bloody extravasation, and indeed the only one which can be formed between the scull and dura mater. If the broken vessels be few, and the quantity of blood which is shed be small, the symptoms are generally slight, and by proper

treatment disappear. When they are large, or numerous, or the quantity of extravasated fluid considerable, the symptoms are generally urgent in proportion; but whether they be slight or considerable, whether immediately alarming or not, they are always, and uniformly, such as indicate pressure made on the brain and nerves, viz. stupidity, drowsiness, diminution or loss of sense, speech, and voluntary motion.

This every practitioner knows to be one frequent consequence of blows on the head. But it also often happens, from the same kind of violence, that some of the small vessels, which carry on the circulation between the pericranium, scull, and dura mater, are so damaged, as not to be able properly to execute that office, although there be none so broken as to cause an actual effusion of blood.

Smart and severe strokes on the middle part of the bones, at a distance from the sutures, are most frequently followed by this kind of mischief: the coats of the small vessels, which sustain the injury, inflame and become sloughy, and, in consequence of such alteration in them, the pericranium separates from the outside of that part of the bone which received the blow, and the dura mater from the inside; the latter of which membranes, soon after such inflammation, becomes sloughy also, and furnishes matter; which matter being collected between the said membrane and the cranium, and having no natural outlet whereby to escape, or be discharged, brings on a train of

very terrible symptoms, and is a very frequent cause of destruction[e]. The effect of this kind of violence is frequently confined to the vessels connecting the dura mater to the cranium, in which case the matter is external to the said membrane; but it sometimes happens, that, by the force either of the stroke or of the concussion, the vessels which pass between and connect the two meninges are injured in the same manner; in which case, the matter formed in consequence of such violence is found on the surface of the brain, or between the pia and dura mater, as well as on the surface of the latter; or perhaps in all these three situations at the same time.

The difference of this kind of disease, from either an extravasation of blood, or a commotion of the medullary parts of the brain, is great and obvious. All the complaints produced by extravasation are (as I have already said) such as proceed from pressure made on the brain and nerves, and obstruction to the circulation of the blood through the former; stupidity, loss of sense, and voluntary motion, laborious and obstructed pulse and respiration, &c. and (which is of importance to remark), if the effusion be at all

[e] Comment le pericrane a-t-il pû ainsi se detacher de l'os dans le circonference du coup? ne seroit ce point par l'ebranlement ou le tremoussement de toutes les parties integrantes du crane? Si c'est en consequence d'un tremoussement pareil que nombre de filets qui attachent le pericrane au crane se sont detachés, par la meme raison, plusieurs des filets qui attachent la dure mére au crane ont dû se rompre aussi: d'où s'en suivit un crysipéle, qu'occasion suppuration, ou plutot pourriture.

Le Dran.

considerable, these symptoms appear immediately, or very soon after the accident.

The symptoms attending an inflamed or sloughy state of the membranes, in consequence of external violence[f], are very different; they are all of the febrile kind, and never, at first, imply any unnatural pressure; such are, pain in the head, restlessness, want of sleep, frequent and hard pulse, hot and dry skin, flushed countenance, inflamed eyes, nausea, vomiting, rigor; and, toward the end, convulsion and delirium. And none of these appear at first, that is, immediately after the accident; seldom until some days are past[g].

[f] The difference between these two effects of external violence, was very well understood by Berengarius Carpensis, a most excellent writer on this subject, who says, "Interdum "etiam a contusione non rumpitur aliqua vena, sed rumpuntur "ligamenta illa duræ matris; a quibus resudat aliquid: hisce "vero nisi succuratur, accidunt sæva accidentia, et mors."

Paulus Ægineta has also very particularly distinguished between that degree of contusion, which affects only the outer table of the scull, and that which injures the dura mater. "Porro contusionis hujus duæ existunt differentiæ: vel enim "calva per totam ipsius crassitiem contunditur, ut frequenter "etiam cerebri membrana abscessu occupetur; vel, &c."

[g] "Nulla autem harum contusionum aspectu dignosci potest; "qualis nempe, quantave sit. Non protinus ab ictu malum "se videndum præbet." Hippocrates.

"Sed accidentia quæ sequuntur ad prædictam contusionem, "*inter commissuras*, non sunt per contusionem tantum; sed sunt "per *putrefactionem panniculi læsi*, et cum venit ad certam "quantitatem determinatam incipit febris, et alia accidentia: "et tandem sequitur mors, nisi cito succuratur."

Jacobus Berengarius Carpensis.

One set or class of symptoms are produced by an extravasated fluid, making such pressure on the brain and origin of the nerves, as to impair or abolish voluntary motion and the senses; the other is caused by the inflamed or putrid state of the membranes covering the brain, and seldom affects the organs of sense, until the latter end of the disease, that is, until a considerable quantity of matter is formed, which matter must press like any other fluid.

I am very sensible that it is a generally-received opinion, that blood shed from its vessels, and remaining confined in one place, will become pus; and that the matter found on the surface of the dura mater, toward the end of these cases, was originally extravasated blood. I apprehend both these positions to be false. That pure blood shed from its vessels, by means of external violence, and kept from the air, will not turn to, or become matter, is (I think) proved incontestibly by every day's experience, in many instances, in aneurisms by puncture, in retained menses by imperforate vaginæ, and in all ecchymoses. True pus cannot be made from blood merely, as may be known from the manner in which all abscesses are formed, and from every circumstance attending suppuration; and that the matter found on the surface of the dura mater, after great contusions of the head, never was mere blood, I am as certain, as observation and experience can make me.

Some of the French writers have indeed divided the symptoms of what they call a contusion of

the head, into two kinds, and have named them *primitive* or *original* symptoms, and *secondary* or *consequential* ones: among the former, they rank immediate loss of sense, hæmorrhage, involuntary discharge of urine and fæces, great propensity to sleep, &c.; among the latter they reckon fever, delirium, rigor, convulsion, &c. One kind they impute to the mere extravasation of blood, the other to its putrefaction.

This account, though ingenious and specious, is not founded on fact. It is true, that the two kinds of symptoms are very distinct from each other, as well in their nature, as in their time and manner of access, and so far the remark is true; but from all the observation and examination which I have been able to make, both on the living and on the dead, they appear to me to proceed from very different causes. That both these kinds of symptoms do now and then concur in the same patient, is beyond all doubt; and that the case is thereby rendered complex, and more difficult to be judged of; but this does not constantly happen; and even when it does, I cannot help thinking, that there are generally such distinguishing characteristic marks of each, as may prove the truth of what I have asserted.

In order to explain my meaning as clearly as I can, I will consider the inflammatory effect of contusion by itself, and independent of every other complaint or injury, which may accidentally be joined with it.

If there be neither fissure nor fracture of the

scull, nor extravasation, nor commotion underneath it, and the scalp be neither considerably bruised nor wounded, the mischief is seldom discovered or attended to for some few days. The first attack is generally by pain in the part which received the blow. This pain, though beginning in that point, is soon extended all over the head, and is attended with a languor, or dejection of strength and spirits, which are soon followed by a nausea, and inclination to vomit, a vertigo or giddiness, a quick and hard pulse, and an incapacity of sleeping, at least quietly. A day or two after this attack, if no means preventative of inflammation are used, the part stricken generally swells, and becomes puffy and tender, but not painful; neither does the tumour rise to any considerable height, or spread to any great extent. If this tumid part of the scalp be now divided, the pericranium will be found of a darkish hue, and either quite detached, or very easy separable from the scull, between which and it will be found a small quantity of a dark-coloured ichor.

If the disorder has made such progress, that the pericranium is quite separated and detached from the scull, the latter will even now be found to be somewhat altered in colour from a sound healthy bone. Of this alteration it is not very easy to convey an idea by words, but it is a very visible one, and what some very able writers have noticed[h].

[h] Among these Fallopius particularly: "Inspiciatis diligenter os detectum; quod os, quando est in natura sua, est

From this time the symptoms generally advance more hastily and more apparently; the fever increases, the skin becomes hotter, the pulse quicker and harder, the sleep more disturbed, the anxiety and restlessness more fatiguing, and to these are generally added irregular rigors, which are not followed by any critical sweat, and which, instead of relieving the patient, add considerably to his sufferings. If the scalp has not been divided or removed, until the symptoms are thus far advanced, the alteration of the colour of the bone will be found to be more remarkable; it will be found to be whiter and more dry than a healthy one, or, as Fallopius has very justly observed, it will be found to be more like a dead bone: the sanies, or fluid, between it and the pericranium will also, in this state, be found to be more in quantity, and the said membrane will have a more livid diseased aspect.

In this state of matters, if the dura mater be denuded, it will be found to be detached from the inside of the cranium, to have lost its bright silver hue, and to be, as it were, smeared over with a kind of mucus, or with matter, but not

" coloris subrubri, non candidi prorsus, nec rubri prorsus,
" sed est veluti color mistus ex albo declinans ad rubicundum,
" ut si multo lacte, aut alio colore candido, poneres parum san-
" guinis vel alterius rei rubræ. Sed si videritis inæqualitatem
" coloris in ipso osse detecto, ita ud adsint veluti puncta coloris
" albi, et aridi ossis, quæ aridæ particulæ aliquando majores
" sunt, aliquando minores, &c. sciatis quod os sit contusum."

FALLOPIUS.

with blood. Every hour after this period, all the symptoms are exasperated, and advance with hasty strides: the head-ach and thirst become more intense, the strength decreases, the rigors are more frequent, and at last convulsive motions, attended in some with delirium, in others with paralysis, or comatose stupidity, finish the tragedy [i].

[i] The whole process of this very terrible disease is very accurately related, and very justly accounted for, by Theodoric. "Si vero ob ictus vehementiam, dura mater ab osse fuerit se- "parata: vel aliquo modo læsa (sano & illæso existente cra- "nio) sic cognosces: cum dolor capitis, et lenta febris, sin- "gulis diebus augmentantur, oculorum anguli, ac si spas- "mari vellent, distorquentur; genæ rubent; (quod signum "pravum est in qualibet capitis læsione;) pannus balneatus "superpositus, citius desiccatur; cutis etiam arida et sicca; "et si vulnus fuerit, et, os disco-opertum, color ossis velocius "alteratur; et propter negligentiam curæ, ægro superveniunt "dolores, et febres, spasmus, syncope, et permistio rationis."

THEODOR. *de vuln. capit.*

"Qua vero super cerebri membranam sit, utraqua ratione "difficilis est: nam læsis membranis apparet; ideo enim fe- "bris cum horrore accedunt, faciei rubor, et calor, longe "major quam pro febris modo; somnique tumultuosi; oculi "subpingues, et graniosi et rubentes."

ARCHIGENES *de sanguine subtercurrente.*

Petrus e Largelata, having very accurately related the symptoms attending the formation of matter under the cranium when fractured, says: "Si autem fractura sit parva et "penetrans, tunc fiunt illa signa post aliquod tempus; eo "quod tunc humiditates quæ sunt sub cranio putrefiunt; et "tunc fiunt illa accidentia:" And then very justly adds, "Se- "cundo notes quod omnia illa accidentia possunt advenire ex "percussione capitis, cranio non fracto."

PET. E LARGELATA.

If the scalp has not been divided or removed till this point of time, and it be done now, a very offensive discoloured kind of fluid will be found lying on the bare cranium, whose appearance will be still more unlike to the healthy natural one: if the bone be now perforated, matter will be found between it and the dura mater, generally in considerable quantity, but different in different cases and circumstances. Sometimes it will be in great abundance, and diffused over a very large part of the membrane; and sometimes the quantity will be less, and consequently the space which it occupies smaller. Sometimes it lies only on the exterior surface of the dura mater; and sometimes it is between it and the pia mater, or also even on the surface of the brain, or within the substance of it.

The primary and original cause of all this, is the stroke upon the scull: by this the vessels which should carry on the circulation between the scalp, pericranium, scull, and meninges, are injured, and no means being used to prevent the impending mischief, or such as have been made use of proving ineffectual, the necessary and mutual communication between all these parts ceases; the pericranium is detached from the scull, by means of a sanies discharged from the ruptured vessels; the bone being deprived of its due nourishment and circulation loses its healthy appearance; the dura mater (its attaching vessels being destroyed, or rendered unfit for their office) separates from the inside of the cranium, inflames, and suppurates.

Whoever will attend to the appearances which the parts concerned make in every stage of the disease, to the nature of the symptoms, the time of their access, their progress, and most frequent event, will find them all easily and fairly deducible from the one cause, which has just been assigned; viz. the contusion. As the inflammation and separation of the dura mater is not an *immediate* consequence of the violence, so neither are the symptoms immediate, seldom until some days have passed; the fever at first is slight, but increases gradually; as the membrane becomes more and more diseased, all the febrile symptoms are heightened; the formation of matter occasions rigors, frequent and irregular, until such a quantity is collected, as brings on delirium, spasm, and death.

Hitherto I have considered this disease, as unaccompanied by any other, not even by any external mark of injury, except perhaps a trifling bruise of the scalp; let us now suppose the scalp to be wounded at the time of the accident, by whatever gave the contusion; or let us suppose, that the immediate symptoms having been alarming, a part of the scalp had been removed in order to examine the scull; in short, let the injury be considered as joined with a wounded scalp.

In this case, the wound will for some little time have the same appearance as a mere simple wound of this part, unattended with other mischief, would have; it will, like that, at first discharge a thin sanies, or gleet, and then begin to suppurate: it will digest, begin to incarn, and look

perfectly well; but, after a few days, all these favourable appearances will vanish; the sore will lose its florid complexion and granulated surface; will become pale, glassy, and flabby; instead of good matter, it will discharge only a thin discoloured sanies; the lint with which it is dressed, instead of coming off easily (as in a kindly suppurating sore,) will stick to all parts of it; and the pericranium, instead of adhering firmly to the bone, will separate from it, all round, to some distance from the edges[k].

This alteration in the face and circumstances of the sore is produced merely by the diseased state of the parts underneath the scull; which is a circumstance of great importance, in support of the doctrine advanced; and is demonstrably proved, by observing that this diseased aspect of the sore, and this spontaneous separation of the pericranium, are always confined to that part which covers the altered or injured portion of the dura mater, and do not at all affect the rest of the scalp; nay, if it has by accident been wounded in any other part, or a portion has been re-

[k] "Ubicunque autem ex vulnere intereundum sit, neque "possit homo sanitatem recipere, neque servari, ex his intel- "ligere convenit moriturum; et quod futurum est prognosti- "care. Hyeme plerumque, ante diem quartum, æstate post "septimum, accedit febris; quæ quum supervenit, vulnus red- "dit non sui coloris, et saniem modicam effundit, quodque ex "ipso inflammatum est emoritur, glutinosum efficitur, et car- "nem sale conditam repræsentat."

HIPPOCRATES *de vuln. capit.*

"Ulcus neque alitur neque pus maturat, et sordidum sit."

ARCHIGENES.

moved from any part where no injury has been done to the dura mater, no such separation will happen; the detachment above will always correspond to that below, and be found no where else.

The first appearance of alteration in the wound immediately succeeds the febrile attack; and as the febrile symptoms increase, the sore becomes worse and worse, that is, degenerates more and more from a healthy, kindly aspect.

Through the whole time, from the first attack of the fever, to the last and fatal period, an attentive observer will remark the gradual alteration of the colour of the bone, if it be bare. At first it will be found to be whiter, and more dry, than the natural one; and as the symptoms increase[1], and either matter is collected, or the dura mater becomes sloughy, the bone inclines more and more to a kind of purulent hue, or whiteish yellow; and it may also be worth while in this place to remark, that if the blow was on or very near to

[1] "Tandem subpallidum vel album se ostendit; ubi autem "jam purulentum est, aut pustulæ in lingua nascuntur, labo- "rans mente non constante consumitur."

HIPPOCRATES *de vuln. capitis.*

"Quando sanies est infra cranium, *ipso non fracto,* cranium "est male coloratum: æger sentit gravidinem in ea parte qua "est sanies.—Est os sanum, id est illud cui adhæret dura mater "coloris albi, misti rubedine.—Et quo separatio est major, eo "major ossis quantitas est mutata in colore.—Ultra vero colo- "rem, cognoscitur etiam eo quod siccius sit sano.—Et ultra "colorem et siccitatem, quando incipit ista separatio, incipiunt "aliqua sæva accidentia; et febris, mentis alienatio, stupor, "vigilæ, &c. *Quia incipit supra panniculum aggregari mate- "ria, quæ incipit corrumpi.*"

JACOBUS BERENGARIUS CARPENSIS.

a suture, and the subject young, the said suture will often separate in such manner as to let through it a loose, painful ill-natured fungus; at which time also it is no uncommon thing for the patient's head and face to be attacked with an erysipelas [m].

I have said, that in those cases in which the scalp is very little injured by the bruise, and in which there is no wound, nor any immediately alarming symptoms or appearances, that the patient feels little or no inconvenience, and seldom makes any complaint, until some few days are past. That at the end of this uncertain time, he is generally attacked by the symptoms already recited; that these are not pressing at first, but that they soon increase to such a degree, as to baffle all our art: from whence it will appear, that when this is the case, the patient frequently suffers from what seems at first to indicate his safety, and prevents such attempts being made, and such care from being taken, as might prove preventative of mischief.

But if the integuments are so injured as to excite or claim our early regard, very useful information may from thence be collected; for whether the scalp be considerably bruised, or whether it be found necessary to divide it for the discharge of extravasated blood, or on account of worse appearances, or more urgent symptoms, the state of the pericranium may be thereby sooner and more certainly known: if in the place of such

[m] "Suturas tempore curationis disjungi grave est."
ARCHIGINES DE SIGNIS.

bruise, the pericranium be found spontaneously detached from the scull, having a quantity of discoloured sanies between them under the tumid part, in the manner I have already mentioned, it may be regarded as a pretty certain indication, either that the dura mater is beginning to separate in the same manner, or that if some preventative means be not immediately used, it will soon suffer; that is, it will inflame, separate from the scull, and give room for a collection of matter between them. And with regard to the wound itself, whether it was made at the time of the accident, or afterward artificially, it is the same thing; if the alteration of its appearance be as I have related, if the edges of it spontaneously quit their adhesion to the bone, and the febrile symptoms are at the same time making their attack, these circumstances will serve to convey the same information, and to prove the same thing[n].

This particular effect of contusion is frequently found to attend on fissures and undepressed fractures of the cranium, as well as on extravasations of fluid, in cases where the bone is entire; and, on the other hand, all these do often happen without the concurrence of this individual mischief. All this is matter of accident; but let the other circumstances be what they may, the spontaneous separation of the altered pericranium, in

[n] Si dans une playe contuse, où le crane est decouvert, on trouve à la circonference de la playe, que le pericrane tienne peu à crane, ou en soit detaché, c'est une preuve certaine que le crane a souffert, quoiqu'il ne soit fracturé; et s'il a souffert, on peut etre assuré que la dure mere a souffert aussi.

Le Dran.

consequence of a severe blow, is almost always followed by a suppuration between the cranium and dura mater; a circumstance extremely well worth attending to in fissures and undepressed fractures of the scull, because, it is from this circumstance principally that the bad symptoms and the hazard in such cases arise.

It is no very uncommon thing for a smart blow on the head to produce some immediate bad symptoms, which after a short space of time disappear, and leave the patient perfectly well. A slight pain in the head, a little acceleration of pulse, a vertigo and sickness, sometimes immediately follow such accident, but do not continue many hours, especially if any evacuation has been used. These are not improbably owing to a slight commotion of the brain, which having suffered no material injury thereby, soon cease. But if, after an interval of some time, the same symptoms are renewed; if the patient, having been well, becomes again feverish and restless, and that without any new cause; if he complains being languid and uneasy, sleeps disturbedly, loses his appetite, has a hot skin, a hard quick pulse, and a flushed, heated countenance; and neither irregularity of diet, nor accidental cold, have been productive of these; mischief is most certainly impending, and that most probably under the scull.

If the symptoms of pressure, such as stupidity, loss of sense, voluntary motion, &c. appear some few days after the head has suffered injury from external mischief, they do most probably

imply an effusion of a fluid somewhere: this effusion may be in the substance of the brain, in its ventricles, between its membranes, or on the surface of the dura mater; and which of these is the real situation of such extravasation, is a matter of great uncertainty, none of them being attended with any peculiar mark or sign that can be depended upon as pointing it out precisely; but the inflammation of the dura mater, and the formation of matter between it and the scull, in consequence of contusion, is generally indicated and preceded by one which I have hardly ever known to fail; I mean a puffy, circumscribed, indolent tumor of the scalp, and a spontaneous separation of the pericranium from the scull under such tumor[o].

These appearances therefore following a smart blow on the head, and attended with languor, pain, restlessness, watching, quick pulse, headach, and slight irregular shiverings, do almost infallibly indicate an inflamed dura mater, and pus either forming or formed between it and the cranium[p].

[o] Lorsqu' on trouve le pericrane detaché, il n'y a point a hesiter a faire le trepan. Je sçais que dans un cas pareil on n'auroit rien trouvé d'epanché sous le crane, mais cependant l'operation faite de bonne heure auroit été l'unique moyen de sauver le malade s'il etoit possible, &c.

Si donc plusieurs experiences nous apprennent que la dure mere devient malade en consequence de la contusion de l'os, et que sa maladie degenere en pourriture, ce que a jusq'ici emporte plusieurs malades malgré de recours usités, il faut absolument trepanner de bonne heure. Le Dran.

[p] Si statim ab initio febris primo aut secundo appareat die, illa procul dubio causam agnoscat perturbationem humorum, ac

By detachment of the pericranium, I do not mean every separation of it from the bone which it should cover. It may be, and often is cut, torn, or scraped off, without any such consequence; but these separations are violent, whereas that which I mean is spontaneous, and is produced by the destruction of those vessels by which it was connected with the scull, and by which the communication between it and the internal parts was carried on; and therefore it is to be observed, that it is not the mere removal of that membrane which causes the bad symptoms, but it is the inflammation of the dura mater, of which inflammation this spontaneous secession of the pericranium is an almost certain indication.

A false notion prevailed for many years, that the dura mater was not in general connected with the internal surface of the scull, except at the sutures; and that in all other parts of it, such a vacancy was left as gave free room for what they called its pulsatory motion[q]. This opinion,

animi, quum vulnus incuteretur; cessante causa procatarctica; ac ubi se collegerit æger, desinat illa febricula. Si vero primis diebus, nihil febrile, nec ullum symptoma sentiat æger, seque in nullo discrimine existimat, hunc si subito, die scilicet septimo, vel quarto decimo (nihil licet in victu, rebusve externis peccaverit æger) ac præter expectationem febris invadat, significat latens aliquod, in cranio, cerebro, aut corpore vulnerati.

PET. PAAW. in HIPPOCRAT.

[q] If we consider how clearly and plainly many of the best ancient writers describe the intimate connection between the scull and dura mater, and how perfectly well acquainted many of them were with its morbid separation, we shall wonder how it came to be again forgot; but that it was, is most certain.

which was embraced by many, even of the most eminent practitioners, was the principal reason why the bad effects of contusions of the head

In Hippocrates, Paulus Ægineta, Rhazes, and others, are many passages which prove their knowledge of the natural structure and adhesion of this membrane; and that some of the most eminent writers and practitioners had forgot, or did not attend to it, the following quotations, selected from many more, may evince.

" Dura mater calvariæ connectitur futurarum ope ut pensile " et erectum teneat cerebrum; tum etiam ut per suturas egressa " pericranium procreat: spatium vero inter suturas recte natura " liberum reliquit ut vacuum quoddam esset inter duram ma- " trem et calvariam; has nimirum ob causas; primo ne quic- " quam cerebri systolæ et diastolæ obstaret; secundo ne venæ, " et arteriæ per externam duræ matris partem sparsæ levi " aliquo ictu in cranio facto rumperentur; postremo ut ruptis " in dura matre venis, sanguis non inter duram et piam ma- " trem, sed inter duram et cranium effunderetur, et cranio " perforato facilius extraheretur. Et hic est ordinarius naturæ " ordo." Gul. Fab. Hild.

Felix Wirtz says that the elevation of the cranium in slight impréssions is needless; " Id enim motum cerebri, propter *va-* " *cuum* et distantiam quæ est inter meningem et cranium, " minime impedire." And Hildanus, by way of reproof to what Felix Wirtz says: " Aliquando duram matrem cranio un- " dique adhærere vidimus."

Fallopius, speaking of the dura mater, says: " Continuo " pulsat, quare non facile sanatur."

Petruse Marchetti supposed the dura mater always to be at a distance from the scull in those who were bald. Speaking of the treatment of a particular case, he says: " Post septimam " nempe oleum hyperici, quia calvus erat patiens atque mem- " brana a calvaria distabat; quod in calvis semper observavi." Pet. e Marchetti *Obs. Chir.*

" Aliquando contingit ut dura mater cranio satis firmiter ad- " hæreat, sed hæc *admodum raro evenire solet, atque præter* " *naturæ* consuetudinem est." Muys *Prax. Rat. Chirurg.*

were so little understood, and so grossly mistreated by them. They supposed that the vacuity between the dura mater and cranium was sufficient, in general, to defend the former from all external violence; and the blood and matter so often found between them were thought to be deposited in a space naturally vacant. Upon this principle stood both their opinion and practice; and therefore it is not to be wondered at, that their accounts, in general, are so perplexed, and so seldom verified by the examination of dead subjects.

It sometimes happens, that the scalp is so wounded at the time of the accident, or so torn away, as to leave the bone perfectly bare; and yet the violence has not been such as to produce the evil I am now speaking of. In this case, if the pericranium be only turned back, along with the detached portion of scalp, there may be probability of its reunion, and it should therefore be immediately made clean and replaced for the purpose of such experiment, which, if it succeed, will save much time, and prevent considerable deformity. If this attempt do not succeed, the detached piece may be removed, and the case then becomes as if the scalp and the

This was also the opinion of Sylvius, Pacchioni, Ambrose Paré, Serjeant Wiseman, Baglivi, Barbette, and of all those who maintained the doctrine of the oscillation of the dura mater, and who believed that that membrane was found sometimes higher, sometimes lower, that is, sometimes nearer to, sometimes farther from the scull, at one age, and at one time of the moon, than another.

pericranium had been forced away at the time that the wound was first inflicted; and the worst that can happen, will be an exfoliation from the bare scull[r].

It does also sometimes happen, that the force which detaches or removes the scalp does also occasion the michief in question; but the integument being wounded, or removed, we cannot have the criterion of the tumor of the scalp, for the direction of our judgment. In these circumstances our whole attention must (as I have already said) be directed to the wound and general symptoms: the edges of the former will (as I have already observed) digest as well, and look as kindly, for a few days, as if no mischief was done underneath; but after some little space of

[r] Not that exfoliation is the necessary consequence of the scull being laid bare: this depends upon other circumstances, besides the mere removal of the scalp and pericranium. The solidity of the surface of the bones, the size of the vessels, and the impulse of the blood through them, are what principally determine that. If the cortex of the bone be not very hard, and the impulse of the blood be capable of counterbalancing the effects of the external air, a granulation of flesh will be generated on the surface of the bone, which will cover and firmly adhere to it, without throwing off the smallest exfoliation, especially in young subjects. On the contrary, if the bone be much hardened, and the vessels thereby constringed; or if such applications be made use of, as will produce an artificial constriction of them, the surface will necessarily become dry, and the juices ceasing to circulate through it, it must part with a scale to a certain depth; that is, that part of the surface through which the circulation ceases to be carried on will be separated from, and cast off by the vessels which nourish the rest of the bone.

time, when the patient begins to be restless, and hot, and to complain of pain in the head, these edges will lose their vermillion hue, and become pale and flabby; instead of matter they will discharge a thin gleet, and the pericranium will loosen from the scull to some distance from the said edges: immediately after this, all the general symptoms are increased and exasperated; and as the inflammation of the membrane is heightened, or extended, they become daily worse and worse, until a quantity of matter is formed, and collected, and brings on that fatal period, which, though uncertain as to date, very seldom fails to arrive.

The method of attempting the relief of this kind of injury consists in two points, viz. to endeavour to prevent the inflammation of the dura mater; or, that being neglected, or found impracticable, to give discharge to the fluid collected within the cranium, in consequence of such inflammation.

Of all the remedies in the power of art, for inflammations of membranous parts, there is none equal to phlebotomy. To this truth many diseases bear testimony; pleurisies, opthalmies, strangulated hernias, &c.: and if any thing can particularly contribute to the prevention of the ills likely to follow severe contusions of the head, it is this kind of evacuation; but then it must be made use of in such a manner as to become truly a preventative, that is, it must be made use of immediately, and freely.

I am very sensible, that it will in general be found very difficult to persuade a person, who

has had what may be called only a knock on the pate, to submit to such dicipline, especially if he find himself tolerably well. He will be inclined to think, that the surgeon is either unnecessarily apprehensive, or guilty of a much worse fault; and yet, in many instances, the timely use or the neglect of this single remedy, makes all the difference between safety and fatality.

It may be said, that as the force of the blow, the height of the fall, the weight of the instrument, &c., can never precisely or certainly determine the effect, nor inform us whether mischief be done under the bone or not, a large quantity of blood may be drawn off unnecessarily, in order to prevent an imaginary evil. This is in some degree true; and if the advice which I have just given were universally followed, many people would be largely bled without necessity; but then, on the other hand, many a very valuable life would be preserved, which for want of this kind of assistance is lost. "Nihil interest, præsidium an satis tu "tum sit, quod unicum est," is an incontested maxim in medicine; and if it be allowed to use such means as may be in themselves hazardous, surely it cannot be wrong to employ one which is not so; at least, if it be considered in a general sense, whatever it may accidentally prove to some few particular individuals.

Acceleration, or hardness of pulse, restlessness, anxiety, and any degree of fever, after a smart blow on the head, are always to be suspected and attended to. Immediate, plen-

tiful, and repeated evacuation by bleeding, have, in many instances, removed these, in persons to whom, I do verily believe, very terrible mischief would have happened, had not such precaution been used. In this, as well as some other parts of practice, we neither have, nor can have any other method of judging, than by comparing together cases apparently similar. I have more than once or twice seen that increased velocity and hardness of pulse, and that oppressive languor, which most frequently precede mischief under the bone, removed by free and repeated bloodletting; and have often, much too often, seen cases end fatally, whose beginnings were full as slight, but in which such evacuation had been either neglected or not complied with.

I would by no means be thought to infer from hence, that early bleeding will always prove a certain preservative, and that they only die to whom it has not been applied: this, like all other human means, is fallible; and perhaps there are more cases out of its reach, than within it; but where preventative means can take place, this is certainly the best, and the most frequently successful.

The second intention, viz. for procuring the discharge of matter collected under the cranium, can be answered only by the perforation of it.

When, from the symptoms and appearances already described, there is just reason for supposing matter to be formed under the scull, the

operation of perforation cannot be performed too soon; it seldom happens that it is done soon enough[s].

The propriety or impropriety of applying the trephine, in cases where there is neither fissure, fracture, nor symptom of extravasation, is a point which has been much litigated, and remains still unsettled either by writers or practitioners.

When there is no reason for suspecting any of those injuries, either from the symptoms, or from the appearances; and the pericranium, whether the scalp be wounded or not, remains firmly attached in all parts to the scull; there certainly is not (let the general symptoms be what they may) any indication where to apply the instrument, and consequently no sufficient authority for using it at all: but whenever that membrane, after the head has received an external violence, separates, or is detached spontaneously from the bone underneath it, and such separation is attended with the collection of a small quantity of thin, brown ichor, an alteration of colour in the separated pericranium, and an unnatural dryness of the bone, I cannot help thinking, that there is as good reason for trepanning, as in the case of fracture; I believe experience would vindicate me, if I said, better reason; since it is by no means infrequent for the former

[s] "His, ubi cito manus admoveatur, salutis aliqua spes "subest; ubi serius, plerique omnes moriuntur."

ARCHIGENES.

kind of case to do well without such operation, whereas the latter (I mean suppuration under the scull) never can[t].

All the best practitioners have always agreed in acknowledging the necessity of perforating the scull in case of a severe stroke made on it by gun-shot, upon the appearance of any threatening symptoms, even though the bone should not be broken; and very good practice it is. A wound by gun-shot (as far as it relates to the scull), is to be regarded only as one attended with a very high degree of contusion, and therefore most likely to produce symptoms accordingly; among which, inflammation of the dura mater stands principal. Experience confirms both; most of the symptoms attending wounds of the head, made by gun-shot, are symptoms of contusion; and the formation of matter between the cranium and dura mater is a very frequent and a very fatal consequence of such contusion.

In short, the spontaneous separation of the pericranium, if attended with general disorder of the patient, with chilliness, horripilatio, languor, and some degree of fever, appears to me, from all the observation I have been capable of

[t] Les auteurs jusqu'ici, ne nous ont parlé du trepan qu'autant qu'il pouvoit servir a relever des pieces du crane enfoncées par un coup violent, ou a donné issue a quelque liqueur, comme seroit du sang, ou du pus, epanché, sous le crane.

La contusion de l'os est un cas, ou le trepan n'est pas moins necessaire; non a cause que l'os est contus, mais pour prevenir la maladie de la dure mére, et de la pie mére; qui en est une suite presque indispensable. LE DRAN.

making, to be so sure and certain an indication of mischief underneath, either in present, or impending, that I should never hesitate about perforating the bone in such circumstances.

When the scull has been once perforated, and the dura mater thereby laid bare, the state of the latter must principally determine the surgeon's future conduct. In some cases, one opening will prove sufficient for all necessary purposes, in others several may be necessary. This variation will depend on the space of detached dura mater, and the quantity of collected matter. The repetition of the operation is warranted, both by the nature of the case, and by the best authorities; there being no comparison to be made between the possible inconvenience arising from largely denuding the dura mater, and the certain as well as terrible evils which must follow the formation and confinement of matter between it and the scull.

It can hardly be necessary for me to observe, to whoever reflects ever so little on the true nature of these cases, that notwithstanding the operation of perforation be absolutely and unavoidably necessary, yet the repetition of blood-letting, of cooling laxative medicines, the use of antiphlogistic remedies, and a most strict observance of a low diet and regimen, are as indispensably requisite after such operation as before; the perforation sets the membrane free from pressure, and gives vent to collected matter, but nothing more; the inflamed state of the parts under the scull, and all the necessary consequences of such

inflammation, call for all our attention, full as much afterwards as before; and although the patient must have perished without the use of the trephine, yet the merely having used it will not preserve him, without every other caution and care.

This being all that our art is capable of doing in these melancholy cases, I wish I could say, that it was most frequently successful. Sometimes it is: the operation, considered abstractedly, is not in itself hazardous, and is the *unicum remedium* for the most immediately impending and most threatening mischief: some have been saved by it, none can escape without it. As there are no certain indications, no *criteria*, whereby we are enabled to judge whether it will prove successful or not, the event of each individual case can alone determine. When that is happy, the means are very justly commended; but when it is not so, they ought not therefore to be condemned; since they are built on rational principles, and are the only means in human power.

CASE I.

A POOR fellow crossing Tower-hill, got, before he was aware of it, into a mob, that was endeavouring to rescue a sailor from a press-gang. The man was knocked down. When the crowd dispersed, he was found senseless, and in that state was brought to St. Bartholomew's hospital,

where he was immediately let blood, and put to bed. In an hour or two, he was so recovered, as to be able to give the preceding account.

When Mr. Nourse (whose week it was for accidents) saw him the next day, the man appeared to be perfectly well, nor did any mark of violence appear on his head, except one small bruise, and that so slight, that it might, with more probability, be attributed to the fall than the blow. However, as he was positive that he had been knocked down, by a very smart blow, from a heavy weapon; and as he certainly had been deprived of sense a considerable time thereby; Mr. Nourse bled him again, and ordered him to be kept in bed, and to a very low diet. At the end of three days the man found himself so well, as to leave the hospital, and go to work. On the twelfth day from that of the accident, he came to my surgery, and complained of being much out of order; said that his head was very uneasy; that he was hot, thirsty, got little or no sleep, and was at times so faint that he could not pursue his labour. He looked ill, assured me he had lived very soberly from the time of his leaving the hospital, and that he had been in his present state for three days past. I took him into the house again, bled him, ordered him a clyster immediately, and that he should be kept in bed.

Next day (13th) he was in much the same state as the preceding; he had passed a restless night, had dosed now and then, but awoke with much disturbance. He had a hot skin, and a

flushed countenance, mixed with a light yellow tint; he complained of general pain and tightness all over his head, but neither to the sight nor to the touch was there any appearance, or sensation, whereon to build a probable supposition of particular mischief. He was again, by the physician's order, let blood, and directed to take the sal absinthii mixture, with a few grains of rhubarb in it, every six hours. He passed the ensuing night in a disturbed manner, and the next day (the 14th) was apparently worse; his skin was hotter, his pulse quicker, and his pain more acute; he also now thought, that one part of his head was tender to the touch, and said, he was sure that was the part that received the blow. This place I examined. The scalp did seem to be rather fuller that natural, but by no means sufficiently so to enable me to form any judgment by. Toward the close of this day he had a slight shivering, was sick, and vomited, and passed the following night without any sleep at all; talking sometimes incoherently, but still capable of giving a rational answer to any question which engaged his attention. On the 15th day, the tumor of the scalp was more apparent, but yet seemed to contain little or no fluid, and was about the breadth of a crown piece. I would have removed that portion of scalp; but while I was intending it, the poor man had a very severe rigor, which disordered him so much, that he begged to be let alone for the present. That afternoon he had two more shiverings, passed very ill the following

night, and next morning was delirious. The tumor now was more risen, contained palpably a fluid, but was by no means tense; I took away the whole tumid piece, by a circular incision, gave discharge to a thin brown sanies, and found the cranium perfectly naked, altered considerably in colour from that of a healthy natural one, but without fissure, fracture, or other evil. That whole night and next day he was delirious; his skin burning hot; he had frequent spasms, which shook his whole frame, and the next night (the 17th) he died.

The whole scalp, except round the edge of the incision, was in a natural state; the pericranium in every other part, except the tumid one, adhered to the bone; and neither inflammation, nor tumor of any kind, all over the rest of the head. Under that part of the scull from which the pericranium had been detached, and from which the scalp had been removed, a very considerable collection of matter was found lying between the dura mater and cranium, but no appearance of disease any where else.

CASE II.

CONTUSION WITH WOUND.

A YOUNG fellow, playing at quoits, was struck down by the perpendicular fall of one of them on his head. It made a large wound, which bled freely, but did not divide the pericranium, and consequently did not denude the scull. The wound was brought together by a stitch made by

somebody at hand; and the man, though stunned at first by the blow, having vomited plentifully, was soon well, and the next day went to his work, which was that of a farrier. The wound was dressed daily with a superficial pledget, by the person who first saw and stitched it, and it seemed to unite kindly.

On the sixth day from that of the accident, he complained of being chilly and faint; and when he had done about half a day's work, found himself unable to bear the heat of the forge, or to stoop to shoe a horse, on account of pain in his head; he therefore left his shop, went home, and sent for the apothecary who first had dressed him. The wound, not being very carefully examined, appeared to be healed, and therefore was not regarded as any cause of the man's present indisposition, who was treated as having a fever from cold and irregularity: he was let blood, and took some medicines; but at the end of three days (nine from the accident) being worse, and incapable of bearing the expence of remaining at home, he was brought to St. Bartholomew's hospital. On the tenth day from that on which he was wounded, I saw him. He had a considerable degree of fever; his pulse was hard and quick, his skin hot and dry, his face flushed, his eye languid, and he complained of great pain and tightness all over his head. The wound was apparently but not really healed; I could pass a probe underneath, from one end to the other of it; and I could feel the cranium bare the whole way. I divided its whole length; found the pericranium sloughy,

and detached to a considerable distance, and the bone much altered in colour; upon sight of which, I removed the whole separated part, by a large circular incision.

From the symptoms and appearances I prognosticated no good. He was again let blood, and had a clyster, and a lenient purge, which together produced three stools. That night (the 10th) he had a rigor, after which his pain became more intense, and fever higher.

The next morning (the 11th) he had another shivering; and when I saw him about noon, he was very inconsistent. I set on a trephine close to the sagittal suture on one side; and gave discharge to a small quantity of matter which lay on the surface of the dura mater; after being lightly dressed, some more blood was drawn from one of the jugular veins, and he was ordered to take a draught of the salt of wormwood mixture frequently. The next day (the 12th) he was worse. I therefore set the trephine on again, but on the other side of the suture, and by that means let out a considerable quantity of matter from between the scull and membrane. Soon after this, he became more rational, and seemed to get a little sleep; but in the evening his pain returned with great violence, and he had a rigor which held him above an hour.

When I saw him the next day (the 13th) he was senseless, had a low faultering pulse, and a profuse cold sweat; soon after which he expired.

Upon removing the upper part of the scull, a large quantity of matter was found under each

parietal bone, which had detached the dura mater from its connexion with the scull for a considerable space, but not at the suture. On the right side a portion of the dura mater was become sloughy, about the breadth of a shilling; and under this altered part was matter between the two meninges.

The more firm attachment of the dura mater at the sutures, renders the separation of it at these places very difficult: which circumstance, added to the consideration of the situation of the sagittal suture on the very top of the head, renders the application of the trephine on each side of it often absolutely necessary. For if there be good reason to suspect either an extravasation of blood, or a collection of matter in consequence of a blow received on this suture, and one side only be perforated, the operation may happen to be performed on that side where the blood or matter does not lie, and will therefore be successless: or, on the other hand, the extravasation or suppuration may be on both sides; and then the perforation of one only cannot answer the whole purpose, and the patient will as certainly perish, as if nothing had been done at all.

CASE III.

CONTUSION WITHOUT WOUND.

A BOY about nine years old, playing under an empty cart, whose shafts were supported by a stick, was knocked down by the fall of one of

them upon his head. The child was stunned by the blow for a minute or two, but soon became sensible. When he came home, there being a small swelling where the blow had been stricken, his mother applied a bit of linen rag, wet with vinegar; and as he appeared to be perfectly well in a day or two, he was sent to school.

Five days passed over before he made any complaint: on the sixth, he said that his head ached; he brought up his breakfast, and could eat no dinner; but in the evening seemed to be pretty well again. On the 7th, he complained still more of his head, and said that he was very sick and very cold. He was put to bed, but got no rest. As he had not had either small-pox or measles, he was brought home, and treated as if one of these diseases was to follow.

Three days more passed, and no eruption appeared: the fever continued much the same; he was frequently inclined to vomit; and what little sleep he got, was extremely disturbed. He was, by the order of a physician, let blood, had a blister applied to his back, and took some of the common febrifuge medicines. On the 12th day from that of the accident, he was seized with a shivering, which held him more than a quarter of an hour; after which his pain became more acute, and his fever higher. Some blood was drawn from his temples by leeches, and he was ordered some other medicines. On the 13th at noon, he had another rigor, still more severe than the former, and of longer duration; and that evening he became light-headed. By some

means or other, the accident of the blow was now mentioned to the person who attended him, and who desired that a surgeon might look at his head. I found about a third part of the left parietal bone covered by a flattish tumor, containing a fluid.

From the appearance of this swelling, from the date of the accident, the attack, violence, and duration of the symptoms, I made no scruple to give my opinion, that the blow had been the sole cause of all the child's illness; that I suspected the scull under the tumor to be bare, if not injured; that I did also believe, that matter was forming, or formed, under the scull; and that if the last conjecture was true, the only chance the child could have of preservation, must be from the operation of the trephine.

The scalp was divided, and the scull found as I suspected, that is, perfectly bare, and altered from a natural colour: I would therefore have perforated it immediately; but as the bone was not broken, the parents objected to such operation; and the physical gentleman, who had the care of the boy, not having seen much business of this kind, and not rightly comprehending the true nature of the case, joined in opinion with the parents, that such operation was not necessary. It was therefore not performed, and the whole was committed to internal remedies.

The fever increased, and the child's strength decreased in proportion: he continued delirious for three days more, then sank into a state of insensibility, and died.

Having been contradicted, and (as I thought) somewhat improperly over-ruled in the management of the patient while alive, I was the more importunate to get leave to examine him when dead.

All that part of the dura mater which had been covered by the left parietal, and part of the temporal bone, was detached from the said bones, and covered with a considerable quantity of matter. Under the middle part of the former bone the dura mater was discoloured and sloughy; this discoloured part I opened with a lancet, and let out near a spoonful of matter, which matter lay between the meninges. All the rest of the contents of the head were unaffected.

When first I saw this child, all chance of relief from evacuation was over, and his symptoms plainly indicated mischief under the scull. Nothing therefore but perforation could give him any kind of chance.

I do not say that this operation would have saved him; I am much inclined to believe that it would not; but still it was the only thing that could with propriety have been done for him; and therefore it ought to have been done, instead of wasting time with the use of internal remedies, from which no possible good could be expected or derived.

CASE IV.

CONTUSION WITHOUT WOUND.

A LABOURING man fell from a scaffold, two stories high, by which he was for a few minutes stunned and insensible, but soon recovered. He was let blood; and having bruised his right arm, and the same side of his forehead, he was properly dressed by somebody in the neighbourhood.

Next day, being very well, he returned to his labour, and followed it daily for five more. On the sixth, finding himself a good deal out of order, he came to the hospital for advice. He complained of shooting and frequent pain in his head; of giddiness, and inclination to vomit; and said, that he felt as if a cord was drawn tight round his brain. On the right side of his forehead was a small tumor, neither tense nor painful, but palpably containing a fluid. I persuaded the man to let me open it. I found a small quantity of a brown fluid, covering the bone, perfectly denuded of its periosteum; upon which discovery, I removed the whole piece by a circular incision: fourteen ounces of blood were drawn from his arm; a clyster was thrown up, and he was confined to his bed, and barley-water.

Next morning (the seventh) his pulse was full, hard, and frequent; he had slept very little, and that in a very disturbed manner. He was, by the physician's order, let blood again, and di-

rected to take the sal absinthii mixture, with rhubarb sextis horis. On the eighth day, he was let blood again from one of the jugulars, and being rather still costive took a gentle purge. On the ninth, his pulse was still higher and harder, and his skin more hot and dry; twelve ounces more of blood were drawn off from one of the temporal arteries. That evening he had a shivering, after which he complained that his pains were much increased. Next morning (the tenth) his sore looked very ill: was pale, spongy, and glassy, and the scalp separated from the scull to some distance beyond the edges of the wound. I set on a trephine, and removed a piece of the cranium, under which the dura mater was smeared over with matter, and had lost its bright colour. That night he got no sleep, and toward morning had another rigor.

The eleventh, at noon, he was manifestly worse in every respect; his pain was intense, his fever high, and his sore as ill-conditioned as possible. With the largest trephine I had, I took away another piece of the cranium, nearer to the temporal bone, and by means of this opening, procured the discharge of a considerable quantity of matter. This done, finding his pulse still high and full, I drew off ten ounces more of blood, and ordered him a clyster. The loss of blood produced a swooning, which lasted some minutes, after which, he said that he thought his head was rather easier. As the evening approached, his pain returned, wherefore some leeches were applied to his temples. That

night he got a little quiet sleep, and in the morning of the twelfth day said that his head was perfectly easy: a very large discharge of matter had been made through the perforation in the cranium, and I thought that the wound of the scalp wore rather a better aspect. He was kept strictly to a proper low regimen; took at first the sal absinthii mixture freely; when his pain had left him, the physician ordered him the bark; and in a very few days every bad symptom and appearance left him.

Would not this case, which ended so happily, have been attended with the most fatal consequences, if the free perforation of the scull had been omitted, or if less blood had been drawn off?

CASE V.

CONTUSION WITH WOUND.

A YOUNG fellow of about twenty years was thrown from an unruly horse against one of the rails in Smithfield. The blow was great; he lay senseless for above an hour, and in that state was brought into St. Bartholomew's hospital.

He had a large wound on one side of his forehead, the skin of which was partly torn quite off, and partly turned down over his eye. The lips of the wound were, by the person who saw him first, brought as near together as they would admit, but such a portion was lost, as necessarily left the bone bare about the breadth of a shilling.

As soon as his wound had been examined, he was let blood and put to bed. The next day, his pulse being hard and full, he was again let blood, and was ordered to have a clyster, a lenient purge, and some febrifuge medicines. On the third, the wounded scalp, and that side of the face being much swollen, a warm cataplasm was applied over the dressings, and the part was well fomented; and, in about five days more, every thing wore so good an aspect, that the man seemed to be getting well apace. On the ninth, he complained of being out of order, said his head ached, and that he had not slept the preceding night. He was hot and feverish, and his pulse hard and full. He was therefore let blood again, and ordered to have a clyster, and to be kept very low. On the tenth, in the night, he had (as he called it) a chilliness which *came* all over him; after which his pain was considerably increased. On the eleventh, his sore seemed to spread, discharged a thin gleet instead of matter, the lint with which it was dressed stuck fast to all parts of it; and its surface, from having been florid and granulated, became tawny and spongy. That day he had another shivering; and on the next, being the twelfth, a consultation was held on him. He was now very hot and feverish; his face much flushed, an erysipelas beginning to appear on his eye-lids, his sore very ill-conditioned, and the bare bone so much changed from its natural colour, that it looked as if matter might have been seen through it. Consideratis considerandis, it was agreed that he had no chance for his life

but by perforation of the bare cranium. The operation was immediately performed, and a quantity of matter found on the dura mater. For several days the discharge was great, and the man continued very ill; but about the eighteenth day the fever left him, he became easy, the discharge lessened, his sore put on a good face, and he got a natural sleep. From this time nothing sinister happened, and the man got soon well.

CASE VI.

CONTUSION WITHOUT WOUND.

A LAD about twelve years old, standing by a man who was playing at cricket, received a blow from the bat on his forehead. The boy became senseless, and as he was not known to any body present, he was brought to the hospital. He recovered his senses before he got thither; but the part which received the stroke being much swollen, he was dressed, let blood, and ordered to keep in bed. When I saw him next morning, he had no complaint but the soreness of his forehead, under the skin of which there seemed to be a good deal of extravasated, coagulated blood. His pulse was full and strong; he was therefore again let blood; and as he had not had a stool for two days, a clyster was thrown up, and a lenient purge given. A discutient cerate was kept upon his forehead; and, being of a costive habit, he was purged once in two or three days; and on

the ninth, from that of the accident, was discharged from the house. On the fourteenth, he returned to it again, complained of lassitude, giddiness, and head-ach. He was put under the care of the physician, was let blood, vomited, purged, and took proper medicines, but remained much the same for three or four days; that is, he was feverish, with a skin too hot, a pulse too quick, and what little sleep he got was unquiet, and short. On the seventeenth day he had a slight rigor, during and after which his pain in the head was much more intense; and the following day all his febrile symptoms were much exasperated. On the nineteenth, he complained of tenderness to the touch on his forehead, and great general pain in his head. He was again let blood, and was more sunk by the discharge than I could have supposed, but no remission of his symptoms followed. His sleep that night was very little, and very unquiet; toward morning he had two distinct shiverings; and when I saw him at noon, on the twentieth, his forehead appeared somewhat tumid and puffy. From the continuance and exasperation of his symptoms, and from the new appearance on his forehead, I was almost certain there was mischief on or under the scull; I therefore divided the scalp, to examine the bone, and found, between it and the pericranium, which had quitted its adhesion for more than the breadth of a crown piece, a small quantity of a thin, discoloured fluid.

This (as it appeared to me) put the nature of the case out of doubt, and left the boy no chance,

but from perforation. I therefore applied the trephine immediately, and gave discharge to matter formed between the dura mater and bone. For a week after the operation, the discharge was large, and the boy in much hazard; but at the end of that time, the suppuration lessened, the dura mater incarned kindly, and by proper care, and taking freely of the decoct. cortic. Peruv. he got well.

CASE VII.

CONTUSION WITHOUT WOUND.

A MAN in the neighbourhood of St. Giles's had a quarrel with his wife; in which he struck her over the head with a mop-stick. The blow was a smart one, but as it neither fetched blood, nor brought her to the ground, it only finished the dispute, and no farther notice was taken of it. The woman followed her business, which was that of crying greens about the streets, and lived (to use her own words) sometimes drunk, sometimes sober, for a week. On the eighth day from that of the blow, she found herself so ill, that she applied to the hospital for admission; and was taken in as a physician's patient for a fever. The doctor wrote for her; and the day after this (the tenth from the accident) the sister of the ward, in cutting off the patient's hair, which was full of vermin, discovered a swelling, which she desired me to look at: it was flattish,

about the breadth of the palm of a hand, and lay immediately across the sagittal suture. The woman had now a hard full pulse, a hot dry skin, a black tongue, a frequent inclination to vomit, great thirst, intense pain in her head, and got no sleep. From these symptoms and appearances, and from the account which the woman now first gave of the blow, I made no hesitation to say, such blow was the cause of all her symptoms. That night she had a severe rigor, and the next day, the eleventh, an erysipelas had taken possession of part of her visage. I opened the tumor, and finding the bone bare, cleared away the scalp largely, and circularly. I then applied a trephine on one side of the suture and close to it, and found the dura mater altered in its natural colour, and, as it were, smeared over with matter. She passed the succeeding night very ill, was in great pain, got no sleep, and had two shiverings. When I came to her the next day, her whole visage was covered with an erysipelas, and so swollen, that she could not open her eyelids. I applied the trephine on the other side of the suture, and found the same appearance, viz. matter on the surface of the membrane. She had within the last two days been let blood three times, and had constantly taken such medicines as the physician had ordered for her, and which were calculated to abate her fever, and keep her body open. Her symptoms still continued without abatement; the wound of the scalp bore as bad an aspect as possible, she talked very incon-

sistently, got not a wink of sleep, and called perpetually for drink. As the quantity of bone made bare by the removal of the scalp gave room for the farther application of the instrument, I made a third perforation near to the first, and immediately gave thereby discharge to so large a quantity of matter, as to satisfy me the event must be fatal.

The next day the right arm and leg became paralytic; and the day following that, from having been raving, she sunk into a state of perfect insensibility, had a short, laborious respiration, a small, interrupted, faultering pulse, and cold extremities, and on the sixteenth day from that of the accident she died.

Upon opening the head, the dura mater was found covered with matter, under the whole internal surface of both the parietal bones; but the firm adhesion of the longitudinal sinus to the sagittal suture had prevented all communication between the two collections of matter.

CASE VIII.

CONTUSION WITH WOUND.

A LUNATIC threw himself from a window, two stories high, and in his fall struck his head, first against a sign-iron, and then against a slated pent-house.

He was taken up senseless, with three wounds on his head; one just above the right temple,

and two on the top of his head: the wounds were but small, nor was the pericranium divided in any of them. He remained stupid above twelve hours; but being in that space of time let blood freely twice, he recovered his senses, but shewed no signs of a right understanding. He passed two days and nights in the utmost disorder and disturbance. He was confined in a strait waistcoat, and kept two people constantly employed in holding him: at last, by repeated phlebotomy, and taking a large quantity of opium, he fell asleep, slept near twelve hours, and then awoke perfectly tranquil, and perfectly rational. By the sixth day from that of the fall, his wounds were in perfect good order, and seemed to heal without any trouble; the man was in very good health and temper, and perfectly rational and intelligent. He would have been permitted by his friends to have gone out a little way into the country; but lest there should be any latent mischief, I advised him to keep quiet a little longer, and to live with great caution; which advice was followed. On the tenth day from that of the accident, he lost his appetite, looked dull and languid, refused food and company, complained that his head ached, and said that he had not slept. So little time had passed since he had been disordered in his mind, that from his aspect and manner I suspected a return of his lunacy. I let him blood again, directed that he might be kept low, and desired his brother, who was an apothecary, to give him an opiate at going

to bed. The next day, the eleventh, he said that his head-ach had again prevented him from sleeping all night, and that he felt as if a cord was bound tight about his brain: his skin was too hot, his pulse was too hard and too frequent; his urine small in quantity, and high coloured; and the aspect of the wounds in the scalp by no means so favourable as they had hitherto been: one of them looked more spongy and pale than the others. I examined with my probe, and found the scull bare for some space under it. With his own and brother's consent, I removed all the scalp covering the bare cranium, and found it to be considerably altered from a natural colour. I bled him again, and desired that he might take freely of the salt of wormwood and lemon-juice until the next day. That night he had a smart rigor, and the next morning, finding him worse and more disturbed, I made a perforation of the scull. The dura mater under this perforation was dull, and had apparently matter on its surface, though small in quantity. He was dressed lightly; and, as his pulse would very well bear it, eight ounces more of blood were drawn off. The following morning, the thirteenth, he had a still more severe shivering, his pain in his head was greater, his fever higher, and the whole sore so crude, that the lint was with difficulty removed from it. I applied the trephine again, and found the same appearance, viz. a dull discoloured dura mater, and a small quantity of matter. That evening he had an-

other rigor, and was the following day manifestly worse. Convinced, from the symptoms, of his hazard, and firmly believing that matter was collected in such manner as not to be discharged by the two openings already made, I ventured to make a third, and that a large one; which produced an immediate and large discharge of pus. In seven or eight hours I saw him again, and found him easier and more tranquil. He had slept nearly an hour, and his pulse did not feel so rapid, nor so hard. That evening he got more sleep, and the following morning answered every question asked, in such manner as to convince every body that he was certainly better. To shorten the relation, I shall only add, that the discharge continued large for several days, and then gradually decreased: all his symptoms by degrees also disappeared, and in no great length of time, by proper care, he got very well.

When this patient was attacked with his first symptoms, I did not suspect the true cause. His want of sleep, his seeming anxiety, his taciturnity, and great unwillingness to answer any question, seemed to me to bespeak a return of his maniacal disorder. Upon this supposition I gave him the opiate, hoping, that if I could procure sleep he might be better. But when I saw the altered appearance of the wound, and found that the pericranium had quitted its adhesion to the scull, I was no longer in doubt, that whatever else might concur to disorder him, yet all his complaints were fairly deducible from the effects of his fall. And I apprehend he

owed the preservation of his life to the treatment he underwent, in consequence of such supposition.

CASE IX.

CONTUSION WITH WOUNDS.

A WATCHMAN, whose stand was in Whitechapel, got into a scuffle with some drunken sailors, and received several wounds and blows on his head; from some of which he lost so much blood, that he was the next day brought into St. Bartholomew's hospital in a very weak low state.

Not one of the wounds, which were five in number, had passed the pericranium, but his whole head was very much swollen and bruised. He was in other respects very well; that is, he did not complain of sickness, nor any other kind of pain than what soreness the bruises necessarily occasioned; and he had the full and perfect use of his senses. As he had already sustained great loss of blood, and was more than sixty years old, I made use of no farther evacuation, but dressed his head superficially, and directed that he should be kept in bed. At the end of about a week, the general tumefaction was nearly gone, and all the wounds in a healing state; the man transgressed the rules of the hospital by staying out all night, and was discharged. On the fifteenth day from that of the accident, he came to me again, complaining of head-ach, giddiness,

sickness, failure of strength, loss of appetite, and want of sleep.

All the wounds, except one, were perfectly healed; this was on the upper part of the right parietal bone; it was crude, spongy, and the exuberant flesh of such colour and consistence, as inclined me (considering at the same time his general symptoms) to suspect mischief underneath it. I took him into the house again, and immediately removed a circular portion of the scalp, including the wound, and found both pericranium and scull in the state I suspected; that is, the former altered and detached, and consequently the latter bare. Neither the age, habit, nor state of the man, seemed to be capable of bearing free evacuation, nor did I in my own opinion believe that there was time for the experiment. I therefore perforated the middle of the bare part of the bone, and found a sufficient warrant for having so done; that is, a small quantity of matter on the surface of the dura mater. His head was dressed lightly, a little blood was drawn from one of his arms, and a clyster thrown up to procure a stool. The following night he passed ill; had a slight shivering, got little or no sleep, and complained very much of pain in his head; the bare membrane looked very crude, discharged a thin gleet, and pressed hard against the edges of the bone. The next day, his pulse being considerably risen, he was let blood again: that afternoon he had another rigor, and his pain as well as fever became more intense.

On the eighteenth day finding him in every respect worse, I made another perforation just below the former, and gave thereby a discharge to a larger quantity of matter, which the close pressure of the dura mater against the edges of the perforation had hitherto confined. On the twentieth, he was indeed rather easier, but his fever was very high, and both the dura mater and sore in the scalp looked very ill; wherefore suspecting more matter, and being satisfied the man had no other chance for life, I made a third perforation close by the second. This procured so large a discharge of pus, that I was very apprehensive that the extent of the mischief was too great for the assistance of art to prove effectual in: however, I was happily disappointed: for in a very few days more, all his bad symptoms gradually left him, and the man got perfectly well.

From considering all the circumstances of this case, I am satisfied, that had not the cranium been perforated at all, the man must have died, from the collection and confinement of matter: and I am also as much convinced, that the two former perforations would have proved insufficient for the purpose, and that the man owed his preservation to the large removal of bone.

This is a point of practice, which has by no means been sufficiently attended to by practitioners, nor sufficiently inculcated by the writers of our country at least. Many, who see and are convinced of the justness and propriety of it,

want authority to vindicate them in proposing or executing it; and some part of the disgrace which has been cast on the operation of the trepan has arisen from this cause. Practitioners have in general been afraid to make more than one opening, and that generally a small one. If the inflammation be of any extent, or the quantity of matter at all considerable, this one small opening must prove insufficient, either for the relief of the tense inflamed membrane, or for the evacuation of the fluid; and the only probable chance which the patient can have, must be from the removal of a large portion of bone; and this equally in the case of extravasation of blood or serum, as in that of abscess.

CASE X.

CONTUSION JOINED WITH EXTRAVASATION.

A FIREMAN, who was at work on the top of a house, fell in with the roof of it; he was taken out senseless, and brought in that state to the hospital.

He had on different parts of his body several wounds and bruises, but none of them seemed to be of any great consequence. On his head were four, one of some size, on the upper part of the frontal bone near to the coronal suture, two on the left parietal, one on the right side of his head, just above his ear, and a small bruise on the upper part of the os occipitis. Of all these wounds,

the pericranium was divided in one only, viz. that near the coronal suture.

His wounds were dressed, he was largely bled, a clyster was thrown up, and a purging mixture was ordered to be given cochleatim, until he should have a discharge per anum. The next day he was in the same state, perfectly senseless, had the apoplectic stertor, a full labouring interrupted pulse, and some difficulty of respiration. He had four or five large stools, wherefore his mixture was discontinued, but sixteen ounces more of blood were drawn from one of the jugular veins; which evacuation was repeated again in the evening of the same day, to the quantity of eight more. On the third day, being still perfectly stupid, discharging both urine and fæces involuntarily, and having still a full labouring pulse, both the temporal arteries were opened, and fourteen ounces drawn from thence. On the fourth, finding no alteration, and being satisfied that the man's state could hardly be made worse, I determined to perforate the cranium, and accordingly set a large trephine on the upper part of the frontal bone, where the pericranium had been divided. The dura mater was found to be thinly covered with grumous blood, some of which I removed, and thereby made way for the discharge of more. The next day (the fifth), finding that what discharge had been made, during the night, was bloody, and that the man was in no respect altered for the better, I thought I had sufficient authority for repeating the operation, which I accordingly did, close by and

below the former; and as the blow, by which the wound had been inflicted, seemed to have been almost exactly on the top of his head, I made a third opening in the parietal bone, close to the suture. The appearance under all was the same as under the first, viz. a thin layer of grumous, or rather coagulated blood.

Next day (the sixth), toward evening, the man opened his eyes; and on the seventh in the morning he spake. The discharge of blood continued for several days, and at the end of about a week from this time ceased; the dura mater and the wounded scalp wearing as good an aspect as could be wished, and the patient being easy and rational.

On the eighteenth day, he complained of pain all over his head; was sick, reached to vomit, and said that he was faint and chilly. On the nineteenth, his face was flushed, his skin hot, his pulse quick and hard. He was let blood, and ordered to have a clyster, and to take some medicines of a febrifuge kind. A day or two more passed in this manner, his fever not violent, but rather increasing than remitting; his pain, though not acute, yet such as to deprive him of his sleep; little rigors occurring irregularly, no perspiration, and an excessive languor. At last, on the twenty-first day, on the upper part of the os occipitis, on the right side where there had been a small bruise, a tumor arose, so characterised, as to satisfy me that the cause of the late alteration of circumstances lay underneath it: it did not rise to any

height, and contained a small quantity of sanies, but covered a portion of bone which the pericranium had quitted. I removed the scalp, and would have set on a trephine, but the man obstinately refused to submit to it.

On the twenty-fifth day, he lost the use of his left leg and arm, and was at the same time much convulsed in his right; which paralysis and spasm continued until the twenty-seventh, and on the twenty-eighth he died.

Upon examining his head, a collection of matter was found under the bare part of the occipital bone; the dura mater under this matter was sloughy and putrid, and about a desert spoonful of matter lay between the meninges, just under the altered part of the dura mater. In the part where the bloody extravasation had been, every thing was perfectly fair and free from disease.

In this case, there seems to have been as clear a distinction between the bloody extravasation, with its effects, and the inflammatory state of the dura mater, with its consequences, as can be desired. All the first symptoms were such as were caused by mere pressure of the extravasated blood; an obliteration of every sensible faculty, attended with the principal symptoms of an interrupted circulation. Perforation of the scull, where this extravasation had been made, did, by giving discharge to the blood, happily remove these, and the man was getting well apace, until the ills arising from another cause, viz. the inflammatory secession of the dura mater in con-

sequence of contusion, and that in another place, began to appear; they indeed made their attack rather late, nor did they rise so high as they most frequently do; but then it must be considered what discipline the poor man had undergone, and what evacuation had been made. Notwithstanding which, they bore their true, genuine, febrile, inflammatory character, and produced their most frequent event. What perforation of the os occipitale might have done, I cannot say; I fear but little, as the matter was was not only upon, but underneath the dura mater, and that too diseased.

CASE XI.

CONTUSION WITH WOUND.

A DRAYMAN, drunk, and sleeping, fell from his dray, and his head was so squeezed between the wheel and a post, that a considerable portion of the scalp, together with the pericranium, was forced off from each parietal bone.

He was brought to the hospital senseless: he was largely let blood, and the separated scalp being so bruised and mangled as to afford no probability of re-union, it was removed, and the bone dressed with dry lint. The next day the man was so well, and so perfectly master of what sense he had, that I was inclined to believe, that a great deal of the last night's appearance was owing principally to liquor.

In ten days time, the edges of the torn scalp were digested, and bore all the appearance of sores in a healthy man. One of the parietal bones seemed disposed to granulate without any exfoliation, the other looked as if it would throw off a scale.

On the thirteenth day he was so well, that having a large family to work for, he desired to be discharged from the hospital, and to be made an out-patient; but his sores were still so large, and I had so often been deceived by the fallacious appearance of such cases, that I persuaded him to stay another week.

On the sixteenth day he complained much of head-ach, and said, that he was sick and chilly; on the seventeenth, the florid, granulated appearance, and laudable matter of the sores, were exchanged for a tawny, glassy surface, and a plentiful thin gleet. I bled him freely, and bid him keep in bed. On the same day, toward evening, he had a shivering, and the day following, two more; that parietal bone (the left) which had hitherto looked as if it would be covered by a granulation, without exfoliating, now wore so diseased an aspect, that I fain would have set a trephine on it immediately, but the man would not permit me. Every other means were used, but to no purpose. The sore on the right side of the head continued to look well, but the scalp quitted its adhesion to almost the whole left parietal bone, which bone looked very unlike to a healthy one.

On the twenty-third day from that of the accident, he died, having been paralytic in his right leg and arm from the twenty-first.

The appearance of the two sores, as well as of the two bones, were so different, that I had curiosity to see the state of the parts underneath each. On the right side, the dura mater was in a natural, sound, adherent state. On the left, it was separated from almost the whole bone, and covered plentifully by matter, and was, for about the breadth of a half-crown, sloughy; under the slough the pia mater was diseased also, and matter was also formed on the surface of the brain.

CASE XII.

The following case was brought into St. Bartholomew's hospital, while I was confined to my house by sickness. The account therefore of the patient, while living, is as taken by Mr. Earle, (the present Editor); and that of the appearance after death, is in the words of the late ingenious Mr. Partridge, who assisted Mr. Earle in the examination of the body.

On the tenth of February, 1765, John Biggs, a lad about thirteen years old, was driving a horse round a grinding mill; the horse not being used to the work, ran round very fast; the boy fell, and received such a blow from some part of the frame in which the horse worked, that he lay, deprived of sense, for some time, that is, until somebody came in to inquire why the mill

went so rapid. He had a small wound on the right side of his head, and no other apparent mark of injury. In a few hours, by the assistance of phlebotomy he seemed to be very well again. His wound was dressed by the family apothecary for a week, during which time he did not seem to have any other complaint, except now and then having a slight head-ach. The wound not healing kindly, the boy being a country boy, hired only for the purpose of driving the mill-horse, and the people with whom he lived being tired of keeping him unemployed, he was brought to the hospital. The wound was not large, and although he did not seem to have any other complaint, was nearly three weeks in healing.

On the eighth of March, he was seized with a fever, beginning with a kind of cold fit. On the tenth he was much disordered, complained of acute pain in his head; and his wound, which had been healed, broke out again, the pericranium separating from the bone; on the twelfth, he became senseless to all outward objects, was convulsed in all his limbs, and jaw-locked. On this day Mr. Crane trepanned him on the upper, fore and right side of the frontal bone. On the surface of the dura mater was found a considerable quantity of good matter: on the next morning he died.

The dura mater was detached from the cranium for about an inch, all round the perforation of the bone; what matter had been formed on its

surface had been discharged by the operation, and little or none lodged; the pia mater and brain sound in this part. At about two inches distance from the original wound, higher up, and nearer both to the coronal and sagittal sutures, was a small tumor about the size of a split garden bean; within this was a very little discoloured matter, and under it the bone was bare. The dura mater corresponding with this tumor was detached, black and sloughy, and a considerable quantity of matter lay under this sloughy part, communicating with an abscess formed between the two hemispheres of the brain, on the right side of the falciform process.

SECT. III.

SEPARATION, OR DESTRUCTION OF BOTH TABLES OF THE SCULL, FROM CONTUSION.

THE separation of a portion of the cranium, consisting of both tables, or of the whole thickness, happens not unfrequently in old or neglected venereal disorders. The disease, which in these cases has its seat in the diploe, often spoils the whole substance of the bone, and produces a separation or exfoliation of its whole thickness: the dura mater being always found, in such case, to be covered only by an incarnation generated from its surface.

This kind of caries is sometimes of large extent, in one piece, but more frequently it is of smaller size[u], and affects different parts of the same scull. The separated piece is generally quite carious, and appears as if it had been worm-eaten, (what the French call *vermouloue.*) The surface of the bone so diseased is seldom much elevated, though generally somewhat; neither has it often the circumscribed form and appearance of a true node, as it is called; though now and then it has.

The scalp, which covers a bone in this state, is most frequently diseased also; sometimes with one large, ill-conditioned sore; but more often with a number of crude, foul, painful, serpiginous ulcers; through most of which a probe will discover a rough, bare bone; and from which is constantly discharged a greasy stinking sanies. This complaint is generally accompanied by a nocturnal head-ach, pocky spots, and pains about the breast and shoulders; and is almost always preceded by the former, though very frequently that symptom ceases, either during the mercurial courses, instituted for that purpose, or when the pericranium covering the diseased part becomes foul and sloughy.

The proportion of extent of surface, which one table of these diseased parts of the cranium

[u] I have seen, in one case, nearly the whole os frontale cast off; and, in another, the whole left parietal bone.

bears to the diseased part of the other table, is very uncertain, and often very unequal. Sometimes the alteration of the outer table is much more extensive than that of the inner; in which case, when the separation is made, the detached piece comes away very easily, and the uncovered part of the dura mater is small, compared to the size of the external sore; but sometimes, on the contrary, the disease occupies a more considerable extent of the inner table than of the outer, and thereby renders the case more difficult, and the cure more tedious.

A mercurial course begun even before the scalp covering the diseased parts shall have been ulcerated, though it be often sufficient fully and perfectly to eradicate the lues from the habit, will neither prevent, nor cure, this local malady; which will therefore often remain, after such cause of it has been really and totally removed: the bone is thoroughly spoiled (at least in the parts affected); and although the disease, considered abstractedly, be cured, yet the texture of these harder parts necessarily requires more time to cast off what is unsound, and to put on a healthy appearance, than the softer do; the local distemper will remain a long time after. An inattention to, or a misunderstanding of this circumstance, has been the cause why many people have been harassed, and even destroyed with unnecessary mercurial processes, when the complaint has been truly local, which it frequently is after proper previous mercurial treat-

ment. Such medicines will be found to be so far from hastening the removal, that by spoiling the constitution, relaxing the solids, impoverishing and dissolving the fluids, and weakening the vis vitæ, they prevent nature from executing her own purpose, and really protract and retard that effect which they are used (though injudiciously) with design to expedite. Mercury is undoubtedly a specific for the venereal disease, but it is itself a poison. It will also cure some other diseases; but its effects on the human frame are neither light nor superficial. It becomes beneficial or prejudicial, according to the manner in which it is applied; and when it ceases to do good, it will most certainly do harm. This, though a very flagrant instance of it, is not the only one which might be produced; the same observation might be made on the maladies proceeding from a diseased prostate and urethra, producing indurations, and fistulæ in perineo, in which the persistance in the use of mercurials, after the producing lues has been cured, has cost many a man his life, by aggravating and continuing that symptomatic hectic fever (the necessary consequence of pain and irritation) which it should be the whole business of art to calm and attemperate. In all these cases, a strong decoction of sarsaparilla with milk for the common drink, a soft nutritive diet, a clear air, and the free use of the Peruvian bark, will be found to be more conducive to the patient's recovery, than any continued use of mercury. By the former he

will be restored and strengthened, by the latter he will be irritated, wasted, and destroyed[x].

[x] Mr. Pott's remarks on the abuse of mercury are extremely valuable, and deserve every attention. Much mischief has certainly been caused by continuing to give mercury after the venereal virus has been subdued. Mr. Pott has in this place somewhat deviated from his subject of injuries of the head from external violence; but it was principally to shew the similitude between some exfoliations which are caused by the venereal virus, and others which are sometimes the effect of contusion. That large exfoliations do often happen in bones which have been affected with venereal virus, is very certain, though, without question, they are infinitely less frequent than formerly, the disease being better understood, and more attention being paid to it in its earlier stages. It is now, even in hospitals and among the lowest order of persons, very rare to see a carious scull. However, what has been, again may be. I have certainly seen, as Mr. Pott observes, exfoliations almost to the extent of the frontal or parietal bones; but, by judicious management, I think this may sometimes be avoided. Exfoliation of bones cannot take place, most particularly from the cranium, without causing great deformity: it should therefore by all possible means be prevented. Bones being uncovered, and exposed to the air, is the great cause of exfoliation; and this it is the duty of surgeons as much as possible to avoid. What I would wish to inculcate is, that though through an opening in the scalp the probe discovers a bare bone with a rough surface, it should by no means be uncovered, as I believe has not infrequently been practised; and the admission of air through the small opening should be as much as possible prevented; or where there are several openings leading down to the diseased bone, the intermediate skin should be carefully preserved. If there be reason for suspicion that there still remains some venereal virus, every means which skill, assisted by mercury, can employ, should be used to stop the activity of, and eradicate the poison. When that is done, provided we do not irritate by repeated examinations, or the introduction of any foreign body, the diseased bone will often lie quiet, and any further destruction or deformity will be avoided.

As this observation appears to me important, I shall endeavour

The same kind of exfoliation or separation of

to illustrate it by relating a case which occurred several years past. I was sent for, to see an unmarried lady in a most respectable family, who had a sore on her forehead a little above the left eye-brow. On examination with a probe, I found the bone bare; and on insinuating it further, it made its way over the whole surface of the os frontis, which was separated from the scalp, and very rough. The skin covering it was smooth, even, and of a healthy natural appearance. There was no other opening or communication with the bone, except that just mentioned: there were some other tumors or risings on other parts of the head. Considering all these appearances, which were accompanied with great and frequent pain in the head, I made no doubt of its arising from venereal poison in the habit. My opinion gave great offence, and I was informed that the lady whose purity I had so boldly arraigned, had been twelve months under the care of the late Dr. F., who, had there been any grounds for my suspicion, must have discovered it. However, as it was not the first time I had witnessed the Doctor's total ignorance of this disease, though in other respects acknowledged by the world an excellent physician, and as I was well acquainted with the various forms and appearances the venereal Proteus can assume, I would not give up my opinion; though at the same time I affirmed that the disease might be innocently caught, and mentioned some cases to prove this assertion. I was however informed that my future attendance would be dispensed with. About a week after, I was desired to meet Dr. F. and two other physicians, one of whom was the late Sir Richard Jebb, who, on seeing the case, immediately pronounced it venereal.

I was now intreated to take care of it, and by the usual means cured the disease. The pains in the head ceased, the small tumors subsided, and no exfoliation took place except at the wound, the rest of the forehead remaining perfectly firm, and the skin covering it without further opening or ulceration.

The disease was afterward traced from a woman with whom the lady had slept, and who had a venereal ulcer, which had probably been in contact with this unfortunate person in a part, from which the cuticle had been by some accident abraded. E.

both tables of the cranium, is sometimes the consequence of mere external violence[y].

The four following examples, which have fallen within my own knowledge, I shall relate without any comment.

CASE XIII.

A GENTLEMAN'S coachman was thrown from his box, on the road between London and Richmond, and received a wound in his forehead, which divided the pericranium, and denuded the bone about an inch above the sinus. The man received no other harm in the fall; the lips of the wound were brought together by suture, and he drove home.

The next day his master, who was a governor of St. Bartholomew's, and a timorous man, sent the patient into that house. As he seemed perfectly well, and the wound looked as if it would

[y] Morgagni deduces this from mischief done to the vessels of the diploe. "Antequam de calvariæ ictibus verba facere "desinamus, illud non est prætereundum, utraque ejus tabula "prorsus illæsa, illæsisque subjectarum meningum vasis, ac- "cidere aliquando ab ictu valido obtusi corporis, ut vascula, "quæ inter tabulas medullæ subserviunt, rumpantur, et san- "guinem fundant; qui procedente tempore corruptus, eoque "acrior factus, quod succos medullosus admisceatur, qui tum "mora et calore, in pessimam degeneret rancedinem, inte- "riorem tabulam carie afficiat; hominique, jam ictu oblito, et "nihil ejusmodi timenti, intro defluens, meninges vitiet ne- "cemque afferat." *De Sedibus et Causis*, &c.

unite without any trouble, I dressed him only with a superficial pledget. This did not succeed, and the edges, instead of uniting, became spongy. I therefore ordered him to be dressed with a little dry lint, thinking that the bare bone would soon throw off a small scale, and finish the matter. At the end of three weeks everything was exactly in the same state; the bone bare, and not likely to exfoliate, and the edges spongy. Being in perfect health, the man was tired of the confinement of the hospital, and was permitted to go home, taking dressings with him.

At the end of two months from the date of the fall, he returned to the hospital again, and desired me to look at his sore; which was not only not healed, but discharged much too large a quantity of matter. The opening was about the size of a silver-threepence, round, soft, and spongy: upon feeling with a probe, I thought that the bone receded too much for a mere loose exfoliation, and as the bone receded, the discharge of matter increased. Upon repeated trials, I was thoroughly satisfied that both these circumstances were true, and also that the loose piece was much too large to be extracted from the present opening.

I considered, that the removal of a circular piece of skin would leave a scar, which would not only be a great deformity, but a deformity which would be liable to misconstructions; and as there were no bad symptoms to be obviated, nor any thing to be done, but merely to remove the loose portion of bone, I made a longitudinal

incision, sufficient for its extraction, and laying hold of it with a pair of forceps, brought it away. It was the whole thickness of the cranium, in every part firm, hard, and perfectly white; and it left the dura mater covered by a florid healthy incarnation. I laid the divided scalp down upon the membrane, without any intervening dressing, and the sore healed in a few days.

CASE XIV.

AN elderly woman riding in a hackney landau, by a sudden jolt struck her head with great violence against an iron hook at the top of it, put there to hold the two parts of the roof together. The blow gave her exquisite pain for the instant, but that soon ceased; and as it caused neither wound nor tumefaction, she took no further notice of it. At the end of near two months, she was seized with a violent pain in her head; so violent, that for several nights she was obliged to have recourse to laudanum, in order to obtain a little broken rest.

In about a week her pain went off, and a tumor arose, just where she had been stricken; that is, just in the middle of the sagittal suture.

Mr. Brown, of Little Britain, had the care of her; with him I saw her; we opened the tumor, and discharged a considerable quantity of discoloured and very offensive matter. I passed my finger into the opening, and to my great

astonishment found it touched the dura mater. We removed a circular piece of the scalp, and found the two ossa parietalia bare, and carious for a considerable extent on each side of the suture; and in the middle of this carious piece, just in the track of the suture, a hole large enough to admit easily any man's finger, without touching the edges of the bone.

No exfoliation was found in the matter, or on the membrane; the dura mater lay at a considerable distance from the scull, in that part; the discharge from within was large and very offensive; and about three weeks from the time of opening, she died suddenly in a kind of fit.

CASE XV.

In the middle of September 1763, a woman about sixty years old fell down stairs backwards; she was stunned by the blow which her head received from one of the steps, and lay senseless some time.

There was neither wound nor considerable bruise; she was let blood, and kept quiet for some few days; at the end of which, finding no inconvenience either general or particular, she ceased to regard it.

On the eighteenth of December, she was taken into the hospital, for a swelling on the right side of her head, nearly of the size of a split Seville orange. This tumor, she said, had

been preceded by a severe head-ach without fever; but as she did not then believe that her fall had any share in the production of her present complaint, she said nothing about it.

Her head being shaved, the tumor appeared full of fluid. I divided the scalp, and let out a quantity of greasy offensive matter. Upon further examination, the bone was found to be bare and carious. I removed such a portion of scalp as brought the whole into view. The natural texture of the bone was destroyed, and in it were several holes, through which a probe might easily be passed, and from which matter was discharged in such manner, and with such motion, as plainly proved that it came from within the cavity of the scull.

She remained in the hospital until the middle of March; during which time no alteration appeared in any part of the bare bone.

The affairs of her family now required her to be at home. She was in perfect good health; was discharged from the hospital; and as she lived very near to me, one of my young gentlemen undertook to take care of her. On the twenty-eighth of March, 1764, a small part of the bare bone came away, and left the dura mater covered by an healthy incarnation; and on the twelfth of April following, the whole remainder, being about a third part of the parietal bone, did the same. From first to last she had no kind of uneasiness, and the sore healed without any trouble.

CASE XVI.

In that ever memorable defence, made by Capt. Gilchrist, on board (as I think) the Southampton man of war, against a most shameful superiority of French force, a sailor received a severe blow on his head by a large splinter: a small wound and a considerable bruise were the immediate consequence; but they were so soon well, that the man did duty in a few days. At about seven weeks distance from the time of the accident, he began to complain of great pain in his head; which pain in a few days rendered him so incapable, that he was put into the hospital at Gosport. He remained there about three weeks, frequently but not constantly in pain; and during that time had three or four fits, like epileptic ones.

He was now sent to St. Bartholomew's hospital, and put under the care of Dr. Pitcairn, by whose order he was bled, purged, and took several medicines. The man having one day mentioned the circumstance of the blow, the doctor desired that I might examine him.

There was not the least degree of swelling or inflammation, no mark or vestige of a scar, nor any elevation of the scalp, or fluctuation of fluid, under it. While I was examining his head, he had a slight attack of spasm; but on my desisting he became easy and tranquil.

The circumstance of this attack, while I was pressing upon the part, did not at that instant strike me as worthy notice, but upon reflection it appeared much so. The next day I made the same experiment, with the same effect; that is, upon hard pressure he became convulsed, which convulsion ceased upon removing the fingers, but was followed by a rigor. On the following day I ventured to repeat the experiment; but the man was so immediately and so terribly convulsed, that I determined never to try it again.

I informed his physician of all that had passed, and we agreed, that considering the inefficacy of all that had hitherto been done, and what had lately happened, the most probable method of attempting his relief would be, by denuding and perhaps perforating the cranium, in the place where the pressure produced so strange an effect.

The next day I removed a circular piece of the scalp, and found the pericranium not of a healthy or sound colour, nor adherent to the bone; which bone was carious, and had several small holes in it, through which a sanies rose and fell, according to the motion of the blood in the brain. I applied a large trephine, without any regard to the suture, and removed a piece of scull. During the time of the operation, the poor man suffered greatly from spasm; but that over, he became easy and quiet.

The dura mater was detached from the scull, and had matter on its surface; which matter was

extremely offensive. The ensuing night he passed ill; and the next day had such a rigor, that I verily thought it was the last trouble the man could have. The day after this I found him vastly better; the discharge from his head had been large, but he had not suffered any return either of spasm or rigor, and his principal complaint was extreme lowness.

The physician prescribed for him; his medicines agreed well with him, and every thing for several days wore a favourable aspect. On a sudden, he was seized with all the symptoms of a peripneumony, and, on the third day from that seizure, died. No apparent cause of mischief was found either within or on the outside of the head, the dura mater was well incarned, and no lodgement of matter.

SECT. IV.

FISSURES AND FRACTURES OF THE CRANIUM, WITHOUT DEPRESSION.

FRACTURES of the cranium were, by the ancient writers, divided into many different sorts, each of which was distinguished by an appellation of Greek etymology, borrowed either from the figure of the fracture, or the disposition of the broken pieces. These are to be found in most of the old books; but as they merely load the memory, without informing the understanding, or assisting

the practitioner, modern authors have generally laid them aside.

This kind of injury is divisible into two general heads; viz. those in which the broken parts keep their proper level, or equality of surface, with the rest of the scull, and those in which they do not; or, in other words, fractures without depression, and fractures with.

These two distinctions are all which are really necessary to be made, and will be found to comprehend every violent division of the parts of the scull (not made by a cutting instrument), from the finest capillary fissure, up to the most complicated fracture: for fissures and fractures, differing from each other only in the width of the breach, or in the distance of the separated parts, and the disposition of broken pieces in large fractures being subject to an almost infinite variety, distinctions and appellations drawn and made from these circumstances might he multiplied to even three times the old number, without imparting the smallest degree of useful knowledge to the man who should be at the pains to get them by heart.

What are the symptoms of a fractured cranium? is often asked; and there is hardly any one who does not, from the authority of writers, both ancient and modern, answer, vomiting, giddiness, loss of sense, speech, and voluntary motion, bleeding at the ears, nose and mouth, &c. This is the doctrine of Celsus, which has been most invariably copied by almost all suc-

ceeding authors, and implicitly believed by almost all readers[z].

The symptoms just mentioned do indeed very frequently accompany a broken scull, but they are not produced by the breach made in the bone; nor do they indicate such breach to have been made. They proceed from an affection of the brain, or from injury done to some of the parts within the cranium, independent of any ill which the bones composing it may have sustained. They are occasioned by violence offered to the contents of the head in general; are quite independent of the mere breach made in the bone; and either do or do not accompany fracture, as such fracture may happen to be or not to be complicated with such other ills.

They are frequently produced by extravasations of blood, or serum, upon, or between the membranes of the brain; or by shocks, or concussions of its substance, in cases where the scull is perfectly entire and unhurt. On the other hand, the bones of the scull are sometimes cracked, broken, nay even depressed, and the patient suffers none of these symptoms[a]. In short, as

[z] " Igitur ubi percussa est calvaria, protinus requirendum " est, num bilem is homo vomuerit, num oculi ejus obcæcati " sint; num per nares, auresve sanguis ei effluxerit; num " conciderit; num sine sensu quasi dormiens jacuerit? &c. " hæc enim *non nisi osse fracto eveniunt.*"

[a] " Si læsus instar dormientis sensus expers deprehendatur; " si oculi ejus obcæcati fuerint; si obmutuerit; si bilem vo- " muerit; si animalis instar malleo icti conciderit; hæc omnia

the breach made in the bone is not, nor can be the cause of such complaints, they ought not to be attributed to it; and that for reasons which are by no means merely speculative. For the practitioner, who supposes that such symptoms do necessarily and certainly imply that the cranium is fractured, must regulate his conduct by such supposition, and remove the scalp, very often without either necessity or benefit; that is, without discovering what he looks for: and, on the other hand, if he does find the scull to be broken, believing all these complaints to be caused by, and deducible from the fracture, he will most probably pay his whole attention to that supposed cause, and may think, that when he has done what the rules of his art prescribe for such case, he has done all that is in his power — an opinion not infrequently embraced; and which has been the destruction of many a patient. For, as on the one hand, the loss of sense, speech, and voluntary motion, as well as the hæmorrhage from the nose, ears, &c. are sometimes totally removed by, or at least disappear during the use of free and frequent evacuation, without

" maximam et subitaneam significant cerebri commotionem, " perturbationem, ac concussionem *quæ non rara integro ma-* " *nente, nec ulla ex parte rupto cranio,* mortem percusso ad- " ferunt." PET. PAAW.

" Dans les playes de tête, les accidens que les auteurs an- " ciens ont appéllès primitifs parcequ'ils arrivent dans l'instant " meme de la blessure, ne sont nullement des accidens, ni des " signes, de la fracture subsistant, mais des accidens, & des " signes, de la commotion de cerveau." LE DRAN.

any operation on the scalp or scull; so on the other, as these symptoms and appearances are not produced by the solution of continuity of the bone, they cannot be remedied by such chirurgic treatment as the mere fracture may require.

If any one doubt the truth of this doctrine, I would desire him to consider the nature, as well as the most generally successful method of treating these symptoms; and, at the same time, to reflect seriously on the operation of the trepan, as practised in simple, undepressed fractures of the scull.

The sickness, giddiness, vomiting, and loss of sense and motion, can only be the consequences of an affection of the brain, as the common sensorium. They may be produced by its having been violently shaken, by a derangement of its medullary structure, or by unnatural pressure made by a fluid extravasated on its surface, or within its ventricles; but never can be caused by the mere division of the bone (considered abstractedly), which division, in a simple fracture, can neither press on nor derange the structure of the parts within the cranium.

If the solution of continuity in the bone be either produced by such a degree of violence, as hath caused a considerable disturbance in the medullary parts of the brain, or has disturbed any of the functions of the nerves going off from it, or has occasioned a breach of any vessel, or vessels, whether sanguine or lymphatic, and that hath been followed by an extravasation, or

lodgement of fluid, the symptoms necessarily consequent upon such derangement, or such pressure, will follow; but they do not follow because the bone is broken; their causes are superadded to the fracture, and although produced by the same external violence, are yet perfectly and absolutely independent of it; so much so, that, as I have already observed, they are frequently found where no fracture is.

The operation of the trepan is frequently performed in the case of simple fractures, and that very judiciously and properly; but it is not performed because the bone is broken, or cracked: a mere fracture, or fissure of the scull, can never require perforation, or that the dura mater under it be laid bare; the reason for doing this, springs from other causes than the fracture, and those really independent on it. They spring from the nature of the mischief which the parts within the cranium have sustained, and not from the accidental division of the bone. From these arise the threatening symptoms; from these all the hazard; and from these the necessity and vindication of performing the operation of the trepan.

If a simple fracture of the cranium were unattended in present with any of the before-mentioned symptoms, and there were no reason for apprehending any other evil in future, that is, if the solution of continuity in the bone were the whole disease, it could not possibly indicate any other curative intention, but the general one in all fractures; viz. union of the divided parts. But

how can such union be promoted or assisted by perforation? it most certainly cannot; and yet perforation is absolutely necessary in seven cases out of ten, of simple undepressed fractures of the scull. Let us for a moment inquire why it is so. The reasons for trepanning in these cases are, first, the immediate relief of present symptoms arising from pressure of extravasated fluid; or second, the discharge of matter formed between the scull and dura mater, in consequence of inflammation; or third, the prevention of such mischief, as experience has shown may most probably be expected from such kind of violence offered to the last-mentioned membrane. These are the only reasons that can be given for perforating the scull, in the case of an undepressed fracture; and very good and very justifiable reasons they are, but not drawn from the fracture.

In the first case (that of an extravasated fluid within the cranium), the relief from perforation is not only sometimes immediate, but frequently is not attainable by any other means. This is a sufficient proof, not only of its utility, but of its necessity.

In the second, of formation of matter (between the scull and dura mater), it is the *unicum remedium;* there is no natural outlet by which such matter can escape; and the only chance of life is from the operation.

In the third, that of mere fracture without depression of bone, or the appearance of such symptoms as indicate commotion, extravasation, or inflammation, it is used as a preventative, and

therefore is a matter of choice, more than *immediate* necessity.

Many practitioners, both ancient and modern, have therefore disused and condemned it; and have, in cases where there have been no immediate bad symptoms, advised us to leave the fracture to nature, and not to perform the operation as a preventative, but to wait until its necessity may be indicated by such symptoms as may both require and vindicate it. This is a point of the utmost consequence in practice, and ought to be very maturely considered.

They who object to the early use of the trephine, speak of it as being frequently unnecessary, and as rendering the patient liable to several inconveniences which may arise from uncovering the dura mater, before there is any good, or at least any apparent reason for so doing. And in support of this their opinion, they alledge many instances of simple fracture which have been long undiscovered, without being attended with any bad symptoms; and of others which, though known and attended to from the first, have done very well without such operation.

They who advise the immediate use of the instrument, do it upon a presumption, that, in considerable violence received by the head, such mischief is done to the dura mater, and the vessels by which it is connected to the cranium, that inflammation of the said membrane must follow; which inflammation generally produces a collection of matter, and a symptomatic fever, which

most frequently baffles all our art, and ends in the destruction of the patient.

What the former assert is undoubtedly *sometimes* true. There have been several instances of undepressed fractures of the scull, which, either from having been undiscovered at first, or neglected, or having been under the care of a practitioner who had disliked the operation, have done very well without it. This is certainly true, but is not sufficient to found a general rule of practice upon: in matters of this sort, a few instances are by no means sufficient to establish a precedent: what has been, or may accidentally prove beneficial to a few, may be pernicious to the multitude: that which is found to be most frequently useful, is what we ought to abide by, reserving to ourselves a liberty of deviating from such general rule in particular cases.

This is one of those perplexing circumstances, which all writers lament, and all practitioners feel, but which, instead of merely complaining of, we should endeavour, as much as in us lies, to correct.

In order to obtain what information we can on this subject, we should consider, first, what the mischiefs are which may most probably be expected to follow, or which most frequently do follow, when perforation has been too long deferred, or totally neglected; secondly, what prejudice or inconvenience does really arise from, or is thought to be caused by the operation itself, considered abstractedly; and thirdly, what proportion the

number of those who have done well without it, bears to that of those who may truly be said to have been lost for want of it, or of those to whom it might have afforded some chance of relief.

With regard to the first, I have already observed in the case of simple undepressed fractures, whenever the trephine is applied, it must be with design either to relieve, or to prevent ills arising from other mischief than the mere breach in the bone; which breach, considered simply and abstractedly, can neither cause such ills, nor be relieved by such operation. One, and that the most frequent of these mischiefs is, the inflammation, detachment, and suppuration of the dura mater, and consequently the collection of matter between it and the scull; a case, of all others attending wounds of the head, the most pressing, the most hazardous, and the least within our power to relieve. On this subject I have expressed my sentiments so much at large, under the preceding article *contusion*, that it is needless to repeat them here. I shall therefore take the liberty of referring the reader back to that, and only remind him of a circumstance well worth his attending to; viz. that there are no immediate or early marks or symptoms, whereby he can certainly know, whether such kind of mischief is done or not; and that when such complaints come on, as indicate that such mischief has been received, although the operation is all that is in our power to do, yet it is

very frequently unsuccessful[b]. Indeed, the only probable method of preventing this evil seems to be, the removal of such a part of the scull, as by being broken appears plainly to have been the part where the violence was inflicted; and which, if the dura mater becomes inflamed, and quitting its connexion suppurates, will, in all probability, cover and confine a collection of matter for

[b] The state of the dura mater, under simple fractures and fissures of the cranium, has been very nicely observed, and very justly described, by some of the best writers of antiquity.

"Si ad cerebri membranam usque pervenerit fractura, non "rademus, sed agnoscere conabimur utrum membrana ab "osse recesserit, an affixa permaneat. Si enim ipsa manet, "inflammatio nulla infestat vulnus, et pus coctum apparet. "Si cesserit membrana, augentur dolores, et febris similiter; "os alium sumit colorem; pus tenue, et crudum effertur; et "si medicus negligenter rem tractat, nec *perforatione* utitur, "hoc graviora symptomata aboriuntur; nempe bilis vomitus, "convulsio, mentis delirium, et febris acuta."

PAULUS ÆGINETA.

"Dico debet dari signum fracturæ, a qua removeatur pan- "niculus grossus. In primo debes scire dispositionem syphæ; "utrum est adherens, an non; videlicet, si adhæserit ossi non "fiet in vulnus apostema calidum; et licet accidit, modicum "erit; ærugo manabit de eo modica; et putredo erit digesta. "Sed si fuerit remotus, vehementiores erunt dolores, et febres, "mutabitur color ossis, et corrumpetur, et manebit de eo "putredo tenuis." RHAZES.

"Si rima sit in superficie, cerebri membrana non absce- "dente, eadem adhibeatur, quæ ad os nudatum demonstrata "est: cerebri vero membrana abscedente, et humore ibi col- "lecto, post primos curationis dies ad terebram properandum "est," &c. ORIBASIUS.

which nature has provided no outlet. This I take to be, not only the best, but the only good reason, for the *early* use of the trephine in simple undepressed fractures of the scull: and I must add, that it appears to me to be fully sufficient to vindicate and authorise it. That it frequently fails of success, is beyond all doubt; the extent and degree of the mischief being too great for it to relieve: but that it has preserved many a life, which must have been lost without it, I am as well satisfied of, as I am of any truth which repeated experience may have taught me.

In matters of this sort, positive proof and conviction are not in our power; all that we can do is, by making a comparison of the conduct and event of a number of similar cases, to come as near to truth as we can, and to get probability on our side.

The second consideration which I proposed to be made was, what mischief or inconvenience may most reasonably be supposed to follow, or to proceed from the mere operation considered abstractedly. They who are averse to the use of it, as a preventative, alledge that it occasions a great loss of time: that it is frequently quite unnecessary; and, that the admission of air to the dura mater, as well as the laying of it bare, is necessarily prejudicial.

The former of these is undoubtedly true; a person whose scull has been perforated, cannot possibly be well (that is, cured) in so short a space of time, as one who has not undergone such operation; supposing such person to have sustained no other injury than the mere fracture: and if the majority of the people whose sculls are

broken were to sustain no other injury, that is, if no other mischief were in these cases in general done to the parts contained within the scull, the objection to perforation would be real and great, and the operation a matter of more serious consideration. But this is seldom, too seldom the case; by much the larger number of those, who suffer a fracture of the scull, are injured with regard to other parts, and labour under mischief of another kind, additional to the fracture; that is, the parts within the cranium are injured as well as the cranium itself. This being the case, the loss or waste of a little time ceases to be an object of so great importance. The hazard, which it is supposed may be incurred from laying bare the dura mater, is indeed a matter of some weight, so much so, that it certainly ought not to be done, but for very good reasons; and yet, although I am clearly of this opinion, I think that I may venture to say, that let the supposed hazard be what it *may*, it cannot in the nature of things be by any means equal to that which *must* be incurred by not doing it, when such operation becomes necessary. In short, if we would form a right judgement of this point, the question concerning it ought to stand thus: Is the chance of ill which *may* proceed from merely denuding the dura mater, equal to that of its being so hurt by the blow, as to inflame, and suppurate? Or is the mischief which may be incurred by mere perforation of the scull, equal to the good which it may produce? These questions, let those who have seen most business of this kind, and who are therefore the best judges, consider and deter-

mine. For my own part, I have no doubt, that although by establishing it as a general rule to perforate in all cases, some few would now and then be subjected to the operation, who might have done very well without it; yet, by the same practice, many a valuable life would be preserved, which must inevitably be lost without it, there being no degree of comparison between the good to be derived from it, when used early, as a preventative, and what may be expected, if it be deferred till an inflammation of the dura mater and a symptomatic fever make it necessary.

The third consideration, viz. what proportion the number of those who have escaped without the operation, bears to that of those who have perished for want of it, is in great measure included in the two preceding; at least the determination of them must also determine this.

My own opinion must, till I find reason to alter it, be the rule of my own conduct; and though I would not by any means pretend to obtrude the former on any one, yet I think it in some measure incumbent upon me in this place to give it.

The number of cases of this kind, which are necessarily brought into a large hospital so situated as Bartholomew's is, in the midst of a populous city, where all kinds of hazardous labour are carried on, has enabled me to make many observations on them; and although I have now and then seen some few of them do well without the use of the trephine, yet, the much greater number, whom I have seen perish with collec-

tions of matter within the cranium, who have not been perforated, and from whom there is no other relief in art or nature, has, I must acknowledge, rendered me so very cautious and diffident, that although I will not say, that I would always and invariably perform the operation in every case of simple fracture, yet the case must be particularly circumstanced, the prospect much fairer than it most frequently is, and my prognostic delivered in the most guarded apprehensive manner, when I omit it. I should be sorry to be so misunderstood, as to have it supposed that I mean to say, that I think the denudation of the dura mater a matter of absolute indifference, or that no ill can proceed from it; this, I know, is a point concerning which the best practitioners have differed, and concerning which we still stand in need of information; but I think I may venture to say, what is fully to my present purpose, viz. that enlarging the opening of a fracture, by means of a trephine, will not produce or occasion much risk or hazard, additional to what must be occasioned by the fracture itself, that has already let in air upon the membrane[c], and

[c] It is to be remarked, that Mr. Pott has in this place been speaking of simple fractures of the cranium without depression, in which he appears inclined to recommend the use of the trephine as a preventative. I must confess I cannot clearly perceive how a simple crack or fissure through the scull can be said to let in air upon the membrane; or, if it did, that it should be a reason for uncovering a greater part of it.

If I may take the liberty after such great authority to offer my opinion, I must say that I do not think the oper-

therefore that consideration is, at least in some degree, at an end; and the principal point to be determined still remains the same, viz. whether upon a supposition, that the dura mater may possibly not have been so injured as to inflame and suppurate in future, the operation ought not to be practised as a preventative, but, on the contrary, ought rather to be deferred until worse symptoms indicate the necessity of it? or whether it ought in general to be performed early, in order, if possible, to prevent and guard against very probable, as well as very terrible mischief?

I know that it may be said, that a fracture, if of any considerable size, or whose edges are fairly distant and unconnected, will of itself make some way for discharge from within; and so it certainly may, and does, in the case of an effusion of fluid blood; but even in this it very seldom proves sufficient for the purpose. But does not the distant separation of the edges imply greater separation of the attaching vessels of the dura mater? and does not experience too often prove this to be the case? In truth, the great advantage which is sometimes derived from considerable fractures, is

ation with the trephine is to be considered of lightly. If the injury which has been received be sufficient to produce mischief, we are by no means certain of finding the seat of it, nor of preventing it by making an opening. I am therefore decidedly against applying the trephine after every simple fracture or fissure, and think it better to defer the operation, till some symptoms indicate the necessity of it. This opinion is drawn from reasoning on the subject, and is confirmed by the many cases of simple fracture which I have known got well without any such operation. F.

most frequent in those cases where portions of bone are so loose as to be removeable, which removal of bone stands in place of perforation, and makes much more for the necessity of the operation in other cases than against it, if properly considered.

I may possibly be told, that Hildanus Wiseman, and others of great and deserved reputation, have been of the former opinion. I know they have; and when I differ from these, or any other good authority, I hope that I shall always do it with caution and diffidence; but I hope also, that I shall never hesitate to differ from any and every authority, when I think that I have truth on my side, and the good of mankind in my view. The above-mentioned writers, together with almost all their contemporaries, had, in simple fractures of the scull, but one contemplation, the extravasation of blood; this they regarded as the cause both of the early symptoms and of the late ones; considering it as acting either by pressure or putrefaction; and therefore, when there was no immediate sign of such extravasation from the effects of pressure, they saw no necessity for early or immediate perforation. But had they not forgotten the universal adhesion of the dura mater to the cranium; had they not, without any, or indeed contrary to all authority from anatomy, formed to themselves an erroneous idea of the disposition of those parts, with regard to each other[d]; had they conceived rightly of the

[d] Some of the writers of this time speak of the supposed vacuity between the dura mater and scull, as being calculated for

consequences of an inflammation and detachment of that membrane, I am much inclined to believe, that they would have altered their opinion, and not in general have left penetrating fractures of the scull to nature; although they had, in some measure, the authority of Celsus for so doing [e].

Before I enter upon the account of the present and most proper method of treating simple undepressed fractures of the scull, it may perhaps be not amiss to make a short inquiry into the opinions which our remote ancestors have delivered down to us on this subject, to take a cursory view of their intention and conduct, and to exa-

the reception of extravasated fluid, in case of accident: which opinion reminds me of that of a much later writer, who says "that the os unguis was made so thin, for its more easy per-"foration in the operation of the fistula lacrymalis."

[e] "In omni vero fisso fractove osse, protinus antiquiores "medici, ad ferramenta veniebant quibus id exciderent. Sed "multo melius est ante emplastra experiri, quæ calvariæ causa "componuntur," &c. CELSUS.

Whoever has an inclination to amuse himself with the different opinions of different writers on the subject of perforating, or not perforating, will find them in Palfyn, Rohalt, and many others.

But that the frequent ill effects of neglecting this operation were not unattended to by many, the following quotation, taken from a number of similar ones, may evince:

"Et scias, sicut volunt veteres, quod non est excusatio ab "incisione, et remotione cranii, cum in eo penetrans fractura "sit; et hæc propter duo; primo quod os capitis, sicut dic-"tum est, debilem facit porum. Secundo, quia si, osse jam "restaurato, acciderit interius (quantocunque modice) gene-"ratio saniei, vel alicujus humoris superflui expellendi, quo-"modo, jam restaurato osse, posset expelli," &c.

"Primum notabile est istud, quod in fractura cranii debes

mine whether the difference between their practice and ours be well grounded or not; it being neither antiquity nor novelty, but utility only, which can demand our regard.

That extravasation of blood, and formation of matter between the scull and membranes of the brain, were the two principal causes of bad symptoms and of death in fractures of the cranium, and that the only rational method of obtaining relief in either case was by making such an opening in the bone as would give discharge to the said fluids, was full as well known to our ancestors as to us. Their intention and ours therefore were essentially alike; and the material difference between our conduct and theirs consists in the manner in, and the instruments by which, we endeavour to execute such intention. When the breach in the bone was small, and no symptoms of immediate extravasation attended, their principal apprehension was, that the sanies, or matter, which they supposed must necessarily be excreted from the edges of the fracture, would drop down, lodge, and be collected on the surface of the dura mater.

To prevent this evil, they endeavoured to enlarge the fracture by abrasion of its edges, by means of scalpra, or rugines. These scalpra

" prohibere apostema, ne accidat in cerebro aut in panniculis,
" &c. Tertium, notabile sit istud; quod si intentio medici
" solum esset, in occupatione solutionis continuitatis, vel frac-
" turæ, stante apostemate, multa mala accidentia possent con-
" sequi, ut corruptio panniculi febris, apoplexia, rigor," &c.
BERTAPAL.

were many in number, and various in their size and figure, according to the opinion or whim of the practitioner. Figures of these are to be seen in many writers; in Andreas a Cruce, in Scultetus, in Fabritius ab Aquapendente, in Berengarius, &c. &c. &c[f]. But whoever examines them, and attends to their proposed use, will find them liable to great objection; he will find that the use of them must be irksome to the patient, tedious to the operator, and unequal to the end proposed. That by such kind of instrument the opening of a small fracture may be enlarged, is beyond all doubt; but if the breach be at all large, or of any length, such method of enlarging it must at best be a very operose one; it must jar and shake the patient's head immoderately; if executed unskilfully, or inattentively, it must be attended with hazard of wounding the dura mater; and when finished, could not properly answer the purpose for which it was designed.

Of these defects, some of the practitioners were in some measure sensible; and therefore, when the fracture was of such size, or so circumstanced, that these scalpra abrasoria would most probably prove insufficient, that is, when the accident was produced by such force, or

[f] "Ex fracturis vero quæ ad cerebri membranas pervenerunt, si simplex fractura sit, angustis scalpris utendum; sin cum contusione aliqua, quod contusum est excidi debebit; idque vel terebellis prius in circuitum foratum, ac mox scalpris admotis, vel protinus ab initio cycliscis."

GALEN.

attended with such degree of contusion, as to render it probable that the parts within were injured, they did not then depend upon this method by abrasion, but had recourse to others by which they removed a portion of the cranium[g]. In the execution of this purpose also, they found themselves subject to many inconveniences, arising partly from the aukward and unmanageable form and make of their instruments, and partly from the inartificial manner in which they applied them.

Terebræ, and terrebellæ, of various sorts, figures and sizes, the cycliscos, or scalper excisorius, and a variety of modioli were invented, and used for this purpose, figures of which may be seen in Vidus Vidius's Comment on Hippocrates de vuln. capit.; in Peter Paaw on the same; in Andreas a Cruce's Officina; in Albucasis and others.

When the piece of bone intended to be removed was larger than could be comprehended within the modiolus then in use, and which was a very defective instrument in many respects, the operation was performed by means of terebræ; which operation was still more coarse, more fatiguing, and more hazardous than that by the mere scalpra.

[g] "In iis quæ usque ad cerebri membranam divisa sunt, si "sola rima sit, iisdem radulis utendum; si collisio aliqua una "sit, terebris exscindere collisum oportet, scalpris adhibitis."
ORIBASIUS.

The piece intended to be taken away was surrounded with perforations made at small distances[h]

[h] " Ministri juxta assideant, quorum unus caput læsi con-
" tineat, alter, opportuna ministeria faciat. Aurium foramina
" lana coacta obturanda sunt, ne sonitu in excisione terreatur.
" His factis, infigendus calvariæ est mucro acutus terrebræ;
" qua læsum os colorem mutavit, juxta integrum; deinde lente
" habena terebram convertere debemus, donec inciso ossi mucro
" insistat; ac tum citatius circumagere oportet habena tere-
" bram convertente, donec mucro in spatium inter duplex os
" descendat; ubi autem foramen altius adactum sit ultra cras-
" situdinem spatii inter duplicem testam ossis quod perforatur,
" tum terebra multo circumspectius convertenda est, ne re-
" pente descendens cerebri membranam violet. Cum jam
" terebra adacta fuerit, ut vel conjectura deprehendatur totam
" ossis crassitudinem esse perforatam, vel perparum solidæ sedis
" infra relictum, tunc is qui operatur, altitudinem degustet
" demissa tenuis acus obtusa parte; ac si quid continuæ sedis
" etiam reliquum sit, deprimendus altius terebræ mucro est,
" eaque lente circumacta, solidum os perforandum. Eadem
" quoque facienda sunt in aliis foraminibus, donec rima in
" ambitu perforata sit. Septa vero media inter foramina satis
" habent spatii, fere quantum specilli augusti aversa pars est.
" Factis foraminibus, tum ad excisionem, quæ dicitur, ve-
" niendum est, ut excisis tum foraminibus tum mediis, læsa
" ossa removeantur." ORIBASIUS.

" Modus autem perforationis est, ut figas unum trypanorum
" (terebarum) super os in circuitu, et revolvas ipsum intra
" manus tuas, donec scias quod os terebratum est; deinde fiat
" permutatio ad alium locum: et sic permutatio fiat usque ad
" ultimum necessitatis. Deinde, cum alio instrumento, quod
" dicitur spatumen, ab uno foramine usque ad aliud os incida-
" tur," &c. BRUNUS *Chir. Mag.*

" Pone trypanum supra os circa scissuram, ubi vis foramen
" facere, et revolve ipsum intra manus tuas donec penetret;
" deinde muta ipsum ad alium locum, et sic fac tot foramina,
" quot sufficiant; deinde pone spatumen in uno foraminum, et

from each other, and then either the scalper excisorius or the scalprum lenticulatum was introduced, and, by means of repeated strokes with a heavy mallet, was driven through all the interspaces between each perforation. By these means the portion of bone so surrounded was removed, and the dura mater was laid bare. The tediousness which must attend the making so many perforations, the disturbance given to the patient's head, as well by the terebra, as by the mallet and chizel, the hazards of wounding the membranes of the brain, and the coarseness and unhandiness of the whole process, are too obvious to need a comment[1].

" levando manum, superius incidatur terminus, qui est inter " foramen et foramen, et fac sic donec separatur os totum."
BRUN. *Chir. Parv.*

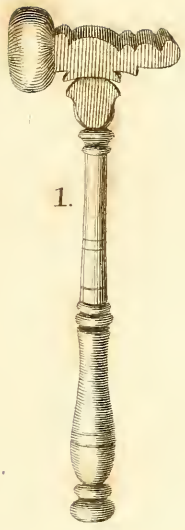
[1] " Quod vero per cycliscos opus administratur, ne id qui- " dem omnino vitio caret, quum quatiat immodice caput, quod " potius quietem postulat." GALEN.

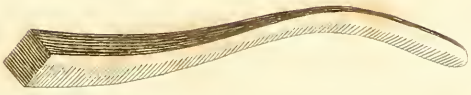
" At quæ per terebellam ratio quidem fungitur, parum tuta " est, propterea quod dum audacius eam tractant, duram me- " ningem non raro violant." GALEN.

" Sæpe scalpros pulsantes adeo ut totum cerebrum per- " moveatur." GALEN.

" Acuta terebra quamplurimas angustas perforationes, cranii " fracturas ambientes, radioli crassitudine equidistantes for- " mare solent; quod vero inter foramina residet, aut rectis, " aut curvis scalpris malleolo plumbeo adactis rescindere ex- " pedit. Lenticulato scalpro, adacto malleolo, id fieri potest; " *horridus* tamen quidem modus est, ac in opere tardus."

" Scalpra hæc omnia citra malleoli operam nullius momenti " sunt; moventur necessario malleolo adacto, præsertim in





1. *Malleus plumbeus.* —
2. *Scalpra.* 3. *Meningophylax.* —
4. *Scalper planus.* 5. *Scalper arcuus.* —

Of this most of them were sensible; they felt the inconveniences, and dreaded the danger so much, as to run into great absurdities, merely to avoid them. They found that they not only wounded the dura mater, but sometimes the brain itself; and therefore had recourse to such precautions, as they thought most likely to prevent these evils. By some we are advised, not to make the perforation quite through the bone, but to endeavour to leave a thin lamina of it entire. By others, to leave the piece, which the modiolus or terebra had surrounded, adhering to the dura mater, to be cast off by its suppuration, lest the hasty detachment of it should be mischievous[k].

" rimis, quæ ad diploidem usque pertingunt; excavant totum " os, *forti adhibita percussione, non tuto sed incommode.*"

ANDREAS a CRUCE.

" Malleus ad percutiendum lenticulatum debet esse de " plumbo ut in parva quantitate magis ponderet."

GUIDO.

" Cavere oportet, ut in terebellæ admotione, ne falleris, " verum qua parte crassissimum os esse visum fuerit, in eam " semper terebellam admotam adigito." HIPPOCRAT.

" Sæpe accidit, ut terebræ repente adactæ, ob naturalem " perforatorum ossium debilitatem, vel tenuitatem, membra- " nam sauciarint." ORIBASIUS.

[k] " Quod si statim initio vulneris inflicti, curationi adhi- " bearis, os ad membranam usque simul et semel exscindere " non oportet, &c. Præterquam quod aliud subest periculum, " si statim ad membranam usque auferas, ne inter operandum " membranam lædas. Sed inter secandum id observato, ut " postquam eo res perducta, ut parum absit quin universum os " pertusum sit, jamque os vacillare incipit, ab ulteriore sec- " tione abstineas, ossique, ut sponte porro secedat, permittas.

The cautions laid down by Hippocrates and others, concerning the part of the bone whereon to fix the instrument, and the great attention which they admonish the operator to pay to its execution, all proceed from the same fear. For the same reason, or from the same well-grounded apprehension, it will be found that many of the best practitioners endeavoured to furnish their perforating instruments with such guards or defences as should prevent them from going too deep[1].

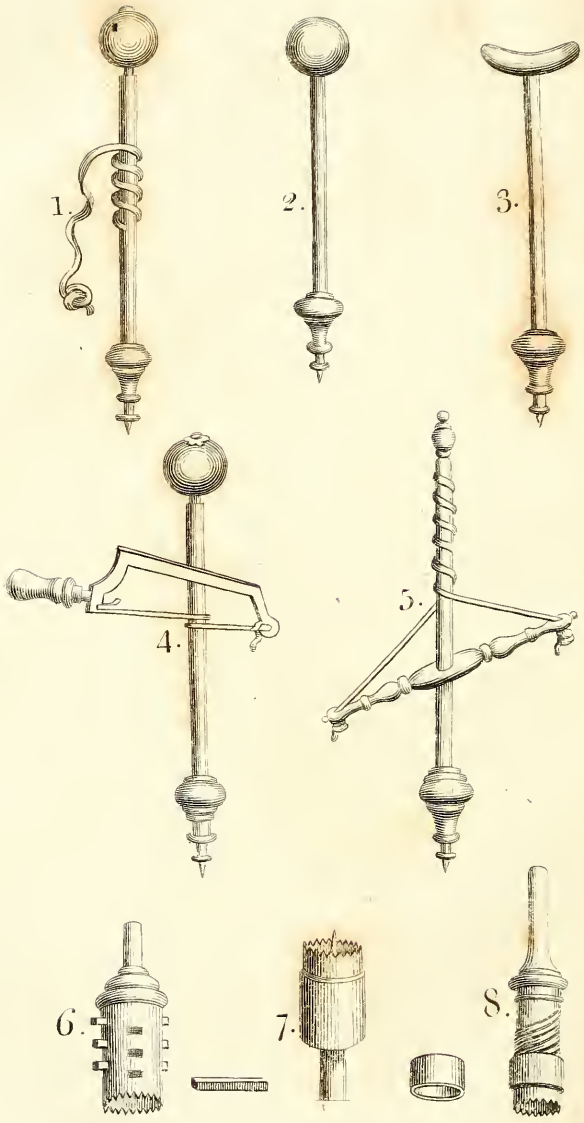
" Namque ossi, quod sectum est, et sine exsectione relictum, " nihil detrimenti accidere potest."

" Cum itaque terebræ occurrit usus, si statem curationi ad- " hibearis, cavesis ne ad membranam usque penetrat, verum " portio ossis tenuis relinquenda." HIPPOCRAT.

[1] " Terebellis autem ipsis, ut mergi non possunt supra " cuspidem, nonnulli supercilium extans efficiunt." GALEN.

" At quia dum terebrum hoc circumagitur, periculum im- " minet ne membranæ lædantur, ideo nonnulli quo minus " aberrarent, et hoc periculi genus evitarent, terebras exco- " gitarunt quæ mergi non possunt, et ob id a Græcis abaptista " dicuntur." ANDREAS à CRUCE.

" Si autem os forte durem est, tunc oportet ut perfores in " circuitu ejus antequam administres incisoria cum terebris, " quæ nominantur terebræ non profundantes; et non nominan- " tur ita, nisi quoniam ipsæ non pertranseant terminum ossis, " ad illud quod est post ipsum, propterea quod terebro est ex- " tremitas rotunda super illud, quod est sub capite ejus acuto, " similis margini, et circulus parvulus prohibet submergi et " pertransire spissitudinem ossis. Et convenit tibi, ut accipias " ex istis terebris numerum multum, quorum unum quodque " conveniat quantitati spissitudinis ossis, donec præsens sit " tibi omni cranio terebrum," &c. ALBUCASIS.



1.2.3.4.5. *Guarded Tenebrae.*

6.7.8. *Guarded Medioli.*

In Albucasis, in Andreas a Cruce, and many others, are figures and descriptions of modioli, duabus, tribus, vel quatuor alis muniti, of those, as well as of terebellæ, called abaptistæ, mespilatæ, tortulatæ, &c.: the number and variety of these is very large, although they are all formed upon the same principle, and all calculated for the same purpose, viz. to perforate the scull without wounding the membrane underneath. But whoever will consider the very different thickness of different sculls, and of different parts of the same scull, and at the same time reflect on the extreme aukwardness of all these instruments, will immediately see how very little dependence is to be laid on such defences, and how mischievous the use of them must very frequently have proved. In short, an attentive consi-

"Modiolus fuit veteribus duplex, estque etiamnum hodie "vulgaris, tum et qui duplicem habet orbem, alterum supra "alterum extantem. Hic abaptistos Græcis; facit namque "orbis sive limbus extans ne profundius mergi queat. Hunc "itaque describit Galenus 6. meth. cap. 6. Quidem autem "quo minus aberrarent, tales terebellas excogitarunt quæ "mergi nequeant, quas inde abaptista vocant. Circumcurrit "enim parum, supra terebellæ supercilium circulus alius par-"vus. Sane expedit complures id genus ad manum habere, "ob quamcunque cranii crassitudinem; nam crassiori longior "convenit terebra, tenuiori brevior," &c.

Pet. Paaw in Hippocrat.

"Si autem validum fuerit os, prius illud terebellis abaptistis "vacatis perforatur. Ejusmodi vero sunt quæ paulo supra "acumen cuspidis eminentias habent, impedientes ne ad cere-"briusque membranam demergi possint."

Paul. Æginet.

deration of what our remote ancestors have delivered down to us on this subject may satisfy us, that their observations on the appearances and symptoms of the ills attending this kind of mischief, that is, fractures of the cranium, were in general extremely just and true, perhaps more so than those of many moderns; that their curative intention, or method of aiming at the relief or cure of such ills, was rational and just; but that the instrumental part of their art was so deficient, so aukward, and so unhandy, that they were thereby not only in general prevented from accomplishing the good they intended, but were not infrequently driven into almost unavoidable mischief.

Reduction of the number of instruments to be used in an operation, and an extreme simplicity and plainness in those which may be required, are a part of the merit of modern surgery.

The majority of the instruments, with which our ancestors perforated the cranium, were contrived to make way for the admission of other instruments; such as the scalper excisorius, the cycliscos, the scalprum lenticulatum, &c. with which they removed a portion of bone. Even the modioli, which were used by them, were so small in the diameter of the saw, as to take away a very small piece at each application; which circumstance necessarily lessened the benefit which might be expected from the use of

C

it, and rendered its repetition more frequently necessary than it needed to have been, if it had been made larger.

Instead therefore of that strange variety and multiplicity of instruments, which I have already mentioned to have been used by them, we now require only a trephine of such a size as to remove a sufficient quantity of bone at once, and an elevator; or perhaps, now and then, a pair of forceps. These are all we ever can want; and these may be so made, as to be manageable by the hand of any man of common judgement, with great ease to himself, with very little fatigue and no hazard to the patient. With these we can make as large or as small an opening in the scull as we please; either for the relief of the dura mater, for the discharge of blood or matter, or for the elevation of depressed or extraction of loose pieces of bone, and that without disturbing the patient greatly, or incurring any risk of wounding the brain or its membranes[m].

[m] It has been customary to make the handle of the trephine of iron, and to form the extremity of such handle in such manner, as to make it serve the purpose of an elevator; thus combining, as it were, two instruments in one. This, I think, is a great fault; such iron handle adds considerably to the weight of the instrument, and that in a wrong part of it; and thereby renders it less manageable. The handle of this instrument should be made of light wood, not too long, and of an octangular figure. Whoever will try the same instruments, thus differently made, will, I think, be immediately sensible of the preference due to the lighter handle. It is almost impossible for the handle of an instrument, whose point or extremity is to be worked with, to be too light. It is no uncommon thing to

I have already said, that what are called the principal and diagnostic signs of a fractured scull are by no means to be depended on, as indicating such mischief to exist; it can therefore be hardly necessary to observe, that what are called the uncertain signs require our regard still less. These have been mentioned by many writers, who have copied each other; such are, the holding a silk or horse-hair tight between the grinding teeth and the hand, and the making it vibrate by striking on it; the biting an hard body, and attending to the pain produced by such action; with several other of like sort; which, not to mention that they imply the patient to be sensible and intelligent, are so truly equivocal as to deserve no notice[n].

All considerations also, which are drawn from the manner in which the violence was given or received, from the weight or kind of weapon or body inflicting it, from the force of the blow, the height of the fall, &c. are all equally fallacious; for every body knows, that very terrible symptoms and consequences are sometimes produced by accidents seemingly slight; and, on the contrary, that people escape unhurt, from what might reasonably have been expected to have

see couching needles, and instruments of like kind, laden with heavy bone handles, the inconvenience of which is too obvious to mention.

[n] "Item percutiatur caput cum levi baculo sicco, de salice "aut de pino, et pone aurem tuam apud caput; et si sanum "est, tunc audies sonum sanum; si fractum aut scissum, audies "sonum mutum." LANFRANC.

proved prejudicial to them. In short, nothing but the sight and touch are to be at all depended upon.

If the integuments be not wounded, or if the wound made in them be so small as not to admit a proper examination of the bone, and the circumstances of the case be such as render such inquiry necessary, a portion of the scalp should be removed. The manner of doing this has formerly been the occasion of much difference of opinion; but there can be no doubt about the greater propriety of removing a piece of the scalp for this purpose, by an incision in a circular form, it being that form which must afford the clearest view. If there be no wound, the point stricken should be made the centre of the incision; if there be a wound, such wound should be made the centre of the piece to be removed: and such piece should always be of size sufficient to render the application of the trephine easy[o] [p].

[o] It may perhaps be remarked, that through the whole of this treatise, whenever I have occasion to speak of the operation of perforating the scull, I mention the trephine only, and take no notice of the trepan, the instrument used by most of our immediate fathers, and still in use through almost all France; my reason is, that the latter is an unmanageable one, and liable to most of the hazard and inconvenience attending the terebræ and terebellæ.

[p] In a former part of this work, Mr. Pott has strongly expressed his disapprobation of removing any part of the scalp unnecessarily. On the same principle, if any doubt exists of finding such mischief underneath the scalp as will make removal of bone necessary, I should recommend to make a crucial incision, rather than at once to take away any part

If the scalp be wounded, and the wound be large enough to render the fracture visible, the course of that must be the operator's direction in making his incision; and if the skin be much torn and bruised, or spoiled, it will generally be found adviseable to take away all that is spoiled at once; as the removal of it will add very little to the patient's pain, or the length of the cure; and the leaving it in this state may be attended with great future inconvenience.

Scalping (as it is called) should always be executed with a knife, and that knife should be so held as to cut through the skin and pericranium in a perpendicular manner, down to the bone at once, that the size of the bare bone may be fully equal to that of the wound in the scalp.

It is hardly necessary to insert a caution against pressing hard with the scalping knife, in the case of large fractures, attended either with great separation of the broken edges, or with loose pieces, the danger is so obvious. And it is also as obvious, that there can be but one method of avoiding such hazard; viz. by removing the scalp from, or rather making the incision in a part beyond the fracture, and where the bone is firm and stable. By these means, not only the risk of hurting the membranes and brain will be avoided, but the whole mischief will be more

of the scalp. By a crucial incision, a satisfactory examination may be made; and if it be found unnecessary to proceed further, the scalp may be laid down again, and preserved: if found necessary, it may be easily removed. E.

fairly and clearly brought into view; a thing which sooner or later must be done, and is always best done at first. No part of the scalp should be wantonly or unnecessarily cut away: but it should always be remembered, that this operation is, and should be performed, with intention to bring, if possible, the whole fracture into sight; and that whatever falls short of fulfilling such intention (if practicable) is wrong, not only, as it does not immediately answer the purpose for which it is intended, but it generally puts the patient under a necessity of undergoing the same pain and trouble a second time.

When the cranium is laid bare, it may not be improper to remark, that writers in general have cautioned us to beware of mistaking either a suture, or the impression of a vessel on the surface of the bone, for a fracture: I say that they have in general cautioned us not to mistake one of these for the other, but have not informed us of the mark by which we may be enabled to make the necessary distinction, although such mark is almost constant and invariable. From the track of a fracture, or fissure, the pericranium is always found loose and detached; whereas to the arterial sulcus, and to the uninjured suture, it is always adherent; besides which, the edges of a fracture will always be found rough to the probe or finger, and the sulcus always smooth; not to add, that the disposition of the sutures is pretty certain, and their appearance in general not extremely like to that of a fracture.

When the scalp is much bruised, or wounded, such wound or bruise points out the place from whence the piece should be removed, in order to examine the bone; and, even although no fracture should be found, is an authority and vindication of such operation, especially if the general symptoms were at all urgent; such symptoms implying mischief somewhere, and such external mark rendering it clear, where the external violence causing such mischief was inflicted. But all the ancient, and many of the modern writers, speak of a particular kind of fracture, in which the scalp covering it is perfectly fair and uninjured, and this they call a contra-fissure. By the general account it is pretty clear, that the majority of those who have spoken of this kind of fracture have supposed that the breach made in the bone was most frequently in the part of the cranium diametrically opposite to that which received the blow; this the term *contra-fissure* implies, and this they most certainly do in general mean should be understood by it, as appears by their directing us to examine and to remove the opposite part of the scalp, if no mischief be found under the part stricken, and the patient labours under what are called the symptoms of a fractured scull.

If the symptoms of a fractured cranium were certain, and to be depended upon, this accidental circumstance, of a breach in the bone having been now and then found in a distant, or even in the opposite part, might be an inducement to look for such mischief there, when it is not found under

the part stricken. A fracture, we might then say, there is somewhere; and it having in some instances been found in the opposite part of the head, it might be right to look for it there. But as what generally pass for, and are called the symptoms of a fractured scull, are by no means to be depended upon, as indicating such complaint to exist any where, as they are producible by concussion, by extravasation, by contusion, &c. and are frequently found where the scull is entire and unhurt, they cannot be deemed a sufficient authority for removing the scalp where no apparent mark of violence is left. The smallest degree of wound or bruise will, in cases where the symptoms are urgent, vindicate the removal of scalp from such part; but where there is no local indication where to operate, I cannot see any vindicable reason for operating at all [q].

The chirurgical intention in perforating the

[q] Morgagni, in his book *De Causis et Sedibus*, has very justly observed, "That if by contra-fissure was meant a breach in "that part of the cranium which is diametrically opposite to "the part wounded or bruised (as some have affirmed), there "could be none of that difficulty which they all allow of find-"ing, or that frequent disappointment in not finding it at all, "since an inquiry into such opposite part must always have led "to the discovery. So that instead of the term *opposite*, that "of *another* part of the cranium ought to have been used." And then the whole of this, which has puzzled so many, will amount to no more than what every practitioner must know, which is, that we frequently find, in cases of great violence, that the scull has been broken in a place very distant from that which received the blow, and which we are not led to the knowledge of by any apparent external mark.

scull, in the case of simple undepressed fractures, is, as I have already observed, either to give immediate discharge to a fluid supposed to be extravasated between the cranium and membranes of the brain; or to obviate and prevent such ills, as may most probably be expected to arise from the contusion causing the fracture; or to let out matter already formed in consequence of the inflammation following such contusion.

In each of these it is most probable, that the mischief, be it which it may, either is or will be seated principally under the track of the fracture; and therefore, whenever the trephine is applied for either or any of these purposes, it ought always to be set on in such manner as that the fracture should, if possible, traverse the circle described by the saw, or at least, so that the instrument might always comprehend the fracture within it.

I am aware that the direction given by most of the old writers on this subject is very different from what I have mentioned; but the instruments with which they operated were so different from ours, and the advantages arising from the comprehension of the fracture within the trephine are so great, and so manifest, that I must take the liberty of inculcating a constant attention to it, as to a circumstance from which great advantages are derivable.

The saw or crown of the trephine should never be too small, especially if the patient be full grown; a circumstance which I thought it right

to mention, because the instrument-makers are very apt to make them so[r].

The number of perforations which it may be necessary to make, can only be determined by the nature of each individual case.

If the operation be performed on account of such symptoms as seem to indicate a bloody extravasation, and so free a discharge is produced by one opening, as alleviates or removes the symptoms that one may be all that may be necessary; but if the first perforation only discovers the disease, and is not followed by such discharge as relieves or removes the symptoms, the operation ought to be repeated again and again.

If there be no symptoms of extravasation, and the instrument has been applied in a preventative sense merely, the length of the fracture must determine the number; one or two only may be made at first; and it may be right to wait for farther direction from future circumstances. The circumstances which may render a repetition of the operation necessary, are, accession or increase of fever; large discharge of matter, or lodgement of the same fluid; inflammatory tension of that part of the dura

[r] The best practitioners have, at times, found themselves necessitated to apply the instrument repeatedly in the same case in order to remove a considerable quantity of bone; and among the writers on this subject, are frequent relations of such facts. The practice is undoubtedly just and right; but I cannot help thinking, from what I have seen of the perforating instruments of many of our predecessors, that a part of their trouble, and of the fatigue of their patients in such cases, might have been much lessened, had the circle of their saw been larger. The advantage of a large circle is great; the inconvenience imaginary.

mater which has already been denuded, &c. Directions to be given by a writer can, on this subject, be only and truly general; all the rest must be left to the judgement of the surgeon, which judgement must be formed from the peculiar nature of each individual case.

When the operation has not been performed as a preventative, but to give discharge to that matter which a symptomatic fever indicates to have been formed, the quantity of such fluid, the extent of the secession of the dura mater, and the state of that membrane, must determine the conduct of the operator. The only chance of relief is, from laying bare a large portion of it, that the discharge may be as free, and the confinement as little as possible; nothing but this can do good; the space of time in which it may prove beneficial is very short, that once elapsed is absolutely irrecoverable; and the necessary operation for obtaining such end may full as well be totally neglected, as done by halves, or too late.

The extent of the injured and separated dura mater, and consequently of the vacuity for the formation and lodgement of matter, is a thing of so much consequence, that it is to be wished we were able to discover it with more precision and clearness than we seem to be able to do. It is the greatest circumstance of hazard to the patient, and of direction to the surgeon. It is that which, if undiscovered or neglected, must destroy the former, and that, which when discoverable, and attended to by the latter, is not only his information, but his vindication.

The concealment of the dura mater within the cranium is one great cause of this great obscurity. This necessarily prevents us from knowing the true state of that membrane, as much and as certainly as it is to be wished we could; but still I cannot help thinking, that there are some circumstances and appearances, as well before perforation as after, which, if carefully and duly attended to, may throw some light on this obscure part of surgery. For example; if, upon dividing the scalp, the pericranium is found to be altered, and perfectly separated from the scull, to which it ought naturally to adhere; or if, some few days after scalping (as it is called), the edges of such wound spontaneously quit their adhesion to the bone all round, to some distance, and instead of being firm, florid, and healthy, become loose, tawny, and flabby; or if the scull, upon being denuded, is plainly of a colour different from that of a healthy sound bone, with a healthy sound membrane under it; or if such bone, after having been either accidentally or designedly laid bare, undergoes such morbid change of aspect, and the patient is at the same time restless and feverish, with tensive pain in the head, and irregularly returning fits of heat and chilliness; I think, that we may most reasonably presume, that the dura mater in such patient is inflamed; and that the seat of such inflammation is under such bare and altered part of the scull.

This presumption, as I have just observed, may take place before perforation; but, if added to these circumstances, which appear before the

operation, we find upon perforating that the membrane is inflamed, detached, altered from its natural texture and brightness, or smeared over with matter, the case is then clear, as to its nature; and it is as clear, that nothing but the removal of a considerable portion of the scull can either give room for the inflammatory tension of the membrane, or make way for the discharge of matter generated on its surface; the two circumstances on which the well-being of the patient depends, the two intentions which must be fulfilled, and which nothing but free perforation can enable us to fulfil. Whatever degree of hazard may be supposed to be incurred, by having exposed the dura mater to the air, cannot be increased by the mere comparative size of the opening; and if we may be allowed to expose our patients to any risk at all, it can only be upon a supposition that a greater degree of good may be deducible from it.

It sometimes happens, that one of the bones of the scull is cracked, and the dura mater underneath such crack is so injured as to become inflamed, and in process of time to suppurate; but there being no early or immediate symptom of such mischief, and the scalp being neither wounded nor bruised in such manner or degree as to authorise the removal of the scalp, the true nature of the case is not known, nor the impending mischief attended to, until the symptoms of inflammation begin to appear. In this situation, after an uncertain number of days, (sometimes more, sometimes less) the patient finds himself out of order, is restless, does not

get natural or quiet sleep, is flushed and chilly by turns, feels pains of the dull tensive kind all over his head, but particularly in the part where the blow was inflicted. Soon after he has got into this state, the part so pained becomes in some degree tumid, the febrile symptoms advancing notwithstanding every internal assistance. If in these circumstances the tumid part of the scalp be divided, and the cranium be found bare, (the pericranium having spontaneously quitted its adhesion) whether it be broken or not, mischief is certainly forming[s] underneath it, and the one remedy is perforation.

It also sometimes happens that a fine capillary fissure runs or is continued under an undivided part of the scalp, from the extremity of a fracture to a distance greater or less; or in other words, the fracture in its track, from being open and apparent, becomes capillary, and is either not seen or not attended to. If the dura mater, under such fissure, does not become inflamed, it may possibly never give any trouble; but if it does become inflamed, and suppurate, the scalp covering such fissure will, at the end of some days, swell, and become tender to the touch; the pericranium will, by separating from the bone, form a sinus along the track of the fissure, a discharge

[s] "Ossium rima occulta interdum non ante septimum diem, "interdum non ante decimum quartum, interdum serius se "ostendit; tum caro ab osse recedit; tumque os lividum ap- "paret; dolores item ichorum diffluentium excitantur; atque "hæc difficulter remediis cedunt." HIPPOCRAT.

of gleet will be made from it upon pressure, and the division of it will display the breach in the bone.

Notwithstanding the fracture from which this fissure is continued be large and open, and the trephine may also have been more than once used to such fracture, yet, when the appearances are such as I have related, if the patient be not entirely free from all general symptoms of inflammatory mischief, it may be depended upon, that the membrane under the fissure is diseased; and if a convenient opening be not made upon the part aggrieved, bad consequences will follow, notwithstanding all that may have been done to the more visible and open part of the fracture; a very strong and convincing proof of the nature of a local inflammation of the dura mater, as well as of the most proper method of treating such disorder.

In cases of great violence offered to the head, whether the scull be broken or not, it sometimes happens, more particularly in young subjects, that we find a suture considerably disjoined; in which circumstance I do not remember ever to have seen one single instance of a recovery [t].

I cannot take leave of this subject without reminding the young practitioner, that although

[t] "Repentina suturarum disjunctio, si causam attendas, sine "aliqua cerebri concussione esse non potest: si effectum, non "sine violenta crasse meningis, illuc magis adhærentis distrac-"tione, ac annectentium sibrillarum ac vasculorum lacera-"tione," &c. MORGAGNI *De Causis et Sed.*

it be impossible for any one, in the case of a highly inflamed or suppurating dura mater, to get well without perforation of the scull, yet that operation must be considered only as one absolutely necessary part of the process toward obtaining a cure; and that phlebotomy, gentle evacuations per anum, proper febrifuge remedies, and a strict low diet and regimen, will be full as necessary after such operation as before it. The removal of a piece of bone takes off some pressure from the tense and inflamed membrane, frees it in some degree from its confinement, and gives discharge to matter and gleet; but it does no more; and every means which can serve to appease the febrile heat, to lessen the velocity of the circulating fluids, to render the skin perspirable, and the patient cool and easy, are full as necessary after as before such operation.

CASE XVII.

SIMPLE FRACTURE.

A PRINCIPAL overseer of one of the great roads near to this town was thrown down with great violence, while he was giving directions to the labourers. He fell with his forehead against a sharp stone, and lay senseless for a few minutes, but soon recovered himself, and walked home. The stone had made a considerable wound, the lips of which were so torn

and bruised, that the surgeon who first saw him cut them away, and by that means detected a fracture, or rather a fissure, of about an inch and a half or two inches in length, on the upper or middle part of the os frontale. The man had neither sickness, giddiness, vomiting, fever, nor any other bad symptom for several days; on which account nothing was done to the fracture, which was dressed with dry lint only. He was twice let blood, and kept to a low cool regimen. At the end of seven days, he found himself so well, that he was desirous of going out; but that not being permitted, he stayed at home, and took great care of himself. On the eleventh day he found himself out of order, said that his head ached, that his stomach was not right, and ate no dinner. The following night he got but little rest. On the thirteenth day, having passed very unquietly the preceding night, he did not rise; and when his surgeon came to dress him, finding him feverish, he let him blood, and gave him a lenient cathartic. In the space of two days more all his symptoms were exasperated; his head-ach was great and constant, his fever high, he got no sleep at all, the edges of the wounded scalp became foul, loose, and spongy, and his forehead and visage were attacked with an inflammatory swelling of the erysipelatous kind. On the sixteenth day he had a severe rigor, and was somewhat delirious, and his eyes became so tumefied that he could not open them. In this state I found him. Being informed of what

I have here related, and having examined the bare cranium, I could not hesitate to say, that I apprehended his complaint proceeded from the formation and confinement of matter within the scull; and that the little chance the man had must be from immediate perforation in the track of the fissure.

The operation was performed, and the dura mater found covered with matter. He was dressed lightly, and lost twelve ounces of blood.

The next day I was informed that he was very rational, but his fever unremitting, and that he got no sleep. On the nineteenth day I saw him again, along with the late Mr. Bethune; the discharge from within the scull was large, and the bare bone and wounded scalp looked very ill; all his other symptoms much the same.

On the twenty-first I was sent for again. He was now delirious in a high degree, paralytic in one arm and leg, and frequently convulsed in the other; the discharge was large and remarkably offensive, his tongue black, the skin of his body burning hot and dry, that of his extremities cold and moist, and I suppose I need not tell the reader what happened that night.

CASE XVIII.

A YOUNG man playing at cudgels in Moorfields received a stroke on his forehead; it did not

seem either to himself or the spectators to have been a severe one; but as it produced blood, it was deemed by the laws of the game a broken head, and he was obliged to yield to his antagonist.

As it gave him no trouble, he took no notice of it; was for several nights afterwards engaged in the same diversion, and followed his daily labour. On the ninth day from that on which he received the blow, he thought that his forehead was somewhat swollen, and felt tender to the touch; on the eleventh it was more tumefied and more painful, and on the twelfth he found himself so much out of order, that he applied to be received into St. Bartholomew's hospital.

An incision was made into the tumor; a thin brown ichor was discharged; and a bare bone being discovered, a circular piece of the scalp was removed, which discovered a fracture. The trephine was applied twice along the track of the fracture, by which means it was almost totally removed. The dura mater was found discoloured, and beginning to have matter on its surface. The patient was let blood, and ordered to take the sal absinth. mixture, with a few grains of rhubarb in it every six hours. The succeeding night was passed ill; the patient complained much of pain, and got little or no sleep. On the fourteenth his fever was high, his skin hot, and his pulse full and hard; fourteen ounces more of blood were taken from one of the jugulars; and as he still continued costive, a lenitive purge was given a few hours afterwards. On

the seventeenth every thing bore a bad aspect, both as to his wound and his general state; he got no rest, his fever was high, and the wound very ill-conditioned. His head was again carefully examined, in order if possible to discover some other injured part. No such injury was found; and it being impossible that he should remain in his present state, evacuation seemed to be his only chance, and therefore fourteen ounces more of blood were drawn from one of the temporal arteries, by which he fainted, and afterwards seemed to be somewhat easier.

For three days from this time he seemed to be considerably better; but on the twenty-first he was again in as much pain as ever, and the sore again began to put on a bad aspect.

The benefit which he had once already received from phlebotomy had been manifest; and as his pulse was well able to bear it again, the temporal arteries were again opened, and he was bled till his pulse failed so much and so suddenly, that I was not a little alarmed. By proper care he was brought to himself, and I had no other trouble during his cure than what proceeded from his extreme weakness, which the bark soon removed.

Although this man may very justly be said to have been saved by the frequent repetition of phlebotomy, yet as matter was beginning to be formed on the surface of the dura mater, and as such matter could have no outlet whereby to escape, it is very clear, that unless the

cranium had been perforated, he must have perished.

CASE XIX.

THE driver of a post-chaise was thrown from his horse near Ware in Hertfordshire, and struck his head against what they call a stepping stone in a wash-way. He was stunned by the blow, and carried into a public house; but in half an hour's time found himself so well as to be able to carry the chaise to the place he was going to, which was just by. The next day finding himself perfectly well, he went to work again, and continued to do so for six days. On the seventh, he found himself sick, vomited twice, and had a kind of fainting fit followed by a great pain in his head, and some degree of fever. From the hardship and the irregular manner of these people's living, his complaints were supposed to be owing to cold, and to intemperance, and he was treated accordingly: but on the ninth day, a tumor appearing on that part of his head which had received the blow, a surgeon examined it, and, upon opening the tumefied part, found a fissure running diagonally across the whole parietal bone. The next day he was brought to St. Bartholomew's hospital. His skin was hot, his pulse hard and quick, and he complained that his head felt as if it was squeezed between two trenchers. The whole fissure being brought into

view, the trephine was applied three times along the track of it; from each perforation a quantity of matter was discharged, and under each the dura mater was much altered. All possible care was taken of him, but to no purpose: every day produced an exasperation of his symptoms. On the fourteenth he became paralytic on one side, and on the sixteenth sunk into a state of perfect insensibility, and toward evening died. The whole internal surface of the left parietal and temporal bones was detached from the dura mater, and covered a large quantity of matter.

CASE XX.

A BRICKLAYER'S labourer was knocked down by the fall of a large heavy pantile, which made a large wound in the scalp, and broke the scull. The fracture began in the left parietal bone, and, traversing the coronal suture, ran about an inch in the os frontale.

He was soon brought to the hospital, where the scalp was immediately removed, so as to make way for the trephine; which instrument was applied on each side of the suture, in such manner as to comprehend the fracture in each application of it.

The dura mater was found to be uninjured; there was neither extravasation, nor any other mark of mischief. The patient was freely and repeatedly let blood, kept to a proper regimen, and prescribed for by the physician. In two

months he was discharged perfectly well, and had not during his cure one single bad symptom.

It may very reasonably be remarked, that this was one of those cases which might have done well without the operation, which I am much inclined to believe: but does not this case, as well as many others of like sort, prove also, that the laying bare the uninjured dura mater is not a matter of such hazard, as some have supposed it to be?

CASE XXI.

A GIRL about nine years old fell from the top of a pretty high hayrick at Islington, and pitched with her head on the ground, which was hard and dry. She was carried home bleeding freely from a wound on one side of the upper part of the head, and a surgeon in the neigbourhood examining her, found that her scull was broken; upon which she was brought to the hospital. The fracture was detected; it began in one parietal bone, and passing the suture, ended in the other, making a course of about three inches in all. It was open, and blood discharged through it.

The trephine was applied to it on each bone; the dura mater was not hurt. She had neither sickness, stupor, pain, nor fever, and got well without any trouble; not even an exfoliation from the bare cranium.

The same remarks as were applicable to the foregoing case, are, perhaps, equally so to this.

CASE XXII.

A FARRIER'S servant received a blow from the foot of a horse which he was shoeing. The blow knocked him down, and bereaved him of sense. He lived near Smithfield, and was brought to the hospital senseless.

I saw him in less than half an hour, and found him to all appearance well, his senses perfectly recovered, and no remains of the injury visible, save a small bruise on his forehead. A discutient cerate was applied to the bruise, he was let blood, a purge was ordered for the next day, and he was advised to keep very quiet.

On the third day he was perfectly well, had no general complaint, and the bruise on his forehead was what is commonly called black and blue.

He continued well until the evening of the seventh day, in which he complained of being faint, chilly, and uneasy in his head, particularly his forehead. The following night he was restless, and in the morning was sick and giddy, and had no appetite. His pulse was very little risen; however twelve ounces of blood were taken from his arm, and he was ordered to take the sal absinth. mixture sextis horis, and keep in bed. The ninth and tenth days were passed in much the same manner; but on the eleventh his fever rose high, and the part of his forehead which had received the blow became

swollen and tender. On the thirteenth the tumefied part palpably contained a fluid, and was therefore opened. A fracture about two inches in length was discovered, running from just above the frontal sinus upward. The trephine was applied in the most depending part, and matter found between the membrane and bone. The day after this operation, finding his pulse to be full and hard, I bled him so freely that he swooned, and was some minutes before he recovered. That night he passed much easier; and although the discharge of matter was considerable for some time, yet, by proper care and due management, both physical and chirurgical, he got well.

I will not assert it to be a general fact, but as far as my own experience and observation go, I think that I have seen more patients get well, whose injuries have been in or under the frontal bone, than any other bones of the cranium. If this should be found to be generally true, may not the reason be worth inquiring into*?

* That this is true, has been proved by many instances. The cause is in great measure assigned, if we recollect that the cerebrum may be hurt with less danger than the cerebellum; and that the greater the distance of a wound from the cerebellum, the less danger there is of that part of the contents of the cranium being injured. It has been frequently demonstrated, that great part of the cerebrum may be taken away without destroying the animal, or even depriving it of its faculties; whereas the cerebellum will scarcely admit the smallest injury, without being followed by mortal symptoms. E.

CASE XXIII.

A LAD about seventeen, the son of a plasterer, was at work with his father at the mansion-house, and fell from a scaffold a considerable height. He lay senseless for some minutes, but in a little time was so much recovered as to walk. On the left side of his head was a small bruise, which gave him little or no pain. He had no symptoms which indicated that he had sustained any mischief; and after having staid at home a day or two at the persuasion of his mother, he returned to his business. On the ninth day from that of his fall, he was seized with a violent shooting pain in his head, was sick, and had a kind of convulsive fit.

As it was not supposed that his fall had any share in that attack, no notice was taken of it; a few ounces of blood were drawn from his arm, and the apothecary who had the care of him gave him some of those medicines that are called nervous.

His head-ach, fever, and watching, continued without remission for several days, and at the end of three weeks he died, paralytic on one side, and convulsed on the other.

A small swelling having appeared on his head three or four days before his death, his father desired me to come and look at it, after that event had happened.

The pericranium was separated from the left parietal bone quite across, by means of a fracture

which traversed the length of the whole bone. A quantity of matter was lodged between the inner surface of the said bone and the outer one of the dura mater, and a smaller collection of matter was also found between the membrane and the pia mater.

CASE XXIV.

A YOUNG man about twenty-two was brought into St. Bartholomew's hospital, considerably hurt by a fall from a high scaffold.

The radius of his right arm was broken about its middle; the tibia and fibula of his left leg were both broken, and one or two of his ribs.

By proper care, in about five weeks, he was so well as to be permitted to get out of bed. The first day of his rising he complained of being sick and giddy, which was imputed to weakness and confinement, and therefore disregarded. For three or four days after this period he complained of constant pain in his head, got no sleep, and was constantly feverish. As he had never made any complaint of his head, nor had apparently sustained any injury on that part, Mr. Nourse (whose patient he was) could not suspect any, and therefore contented himself with the common antiphlogistic regimen. At the end of the sixth week, he complained that his head was painful to the touch; and the day after he had made this complaint, he had a severe rigor, which lasted half an hour. On the

twenty-ninth day, a swelling, palpably containing a fluid, appeared on one side of his head. Mr. Nourse opened it, and found a fracture of the parietal bone three inches long at least, through which matter issued freely. The trephine was applied, a large quantity of matter was discharged, and the dura mater was found sloughy; under which sloughy part was another collection of matter between the membranes, and under this latter abscess the brain was considerably discoloured. He died on the fiftieth day from that of his fall.

CASE XXV.

A BOY, belonging to a horse-dealer in Smithfield, was thrown from a horse, with great violence, against one of the sheep-pens. He had a large wound and a fracture, which began about the middle of the frontal bone, and, passing the coronal suture, ended in the right parietal.

A trephine was set on the fracture in the frontal bone, and a small quantity of grumous blood discharged from between the cranium and dura mater. All that day and night he continued senseless; but the next day, by means of a second plentiful bleeding, he recovered his senses. To render every thing (as I hoped) secure, a small trephine was applied on the other side of the suture, which seemed to comprehend all the breach made in the parietal bone.

For nine days from this time every thing looked well, and the boy was free from complaint; but on the twelfth from the accident, he complained of being much out of order; and the next day the sore looked ill, and a thin gleet was discharged from the dura mater through the lint, which now stuck fast to it, instead of coming off easily as usual, and covered with good matter.

For three days from this time, both the boy and sore remained in much the same state. On the seventeenth, in dressing him, I observed a spongy kind of papilla on one part of the sore, which was very tender to the touch, and from which was discharged, upon pressure, a thin sanious kind of fluid: by means of a probe passed through this papilla, I discovered a sinus with bare bone its whole length: the division of this detected a capillary fissure, of at least two inches in length. A trephine was set on it, and the dura mater was found discoloured, and with matter on its surface. By means of free evacuation at first, and as free use of the bark afterwards, this patient got well.

CASE XXVI.

Two female inhabitants of St. Giles's got drunk together, and quarrelled; one of them threw a stool at the other, and knocked her down. The edge of the stool cut through the

scalp, and broke the left parietal bone. The fracture ran from the middle of the bone as far as the sagittal suture. The girl was dressed that night by somebody in her neighbourhood, and was brought the next morning to the hospital. As she had no bad symptom of any kind, the operation was deferred, and she went on very well for a week; at the end of which time she began to complain in such manner, and her sore shewed such an aspect, that I thought there must be mischief under the cranium. A trephine was set on the fracture; the dura mater was found sloughy and purulent. She was bled again freely, and took proper medicines. On the fifteenth day she had a shivering, and after it a very brisk fever. On the seventeenth she was worse in every respect. On the eighteenth a tumor appeared on the other side of the head. This was opened, and a fissure discovered in the right os parietale. A trephine was set on this fissure, and a discharge given to a large quantity of matter. Every thing that could be done for her was done; but on the twenty-third day she died.

The dura mater was separated from both the parietal bones, and matter found in large quantity under each.

It was for many years a generally-received opinion, that one use of the sutures of the cranium was, to prevent the passage of a fracture from one of the bones to another.

This purpose they may undoubtedly have often accidentally served; but that they are generally

incapable of so doing, manifold experience evinces. Fractures are often seen to pass regularly through a suture, from one bone to the adjoining, without any discontinuation or impediment. This is a fact which ought, by writers and lecturers, to be constantly inculcated, as an inattention to it may be of very bad consequence to individuals: for the practitioner who supposes that a suture will certainly, or not unfrequently, set bounds to a fracture, will, when he has traced such a kind of breach in one bone as far as the suture into which it may happen to run, not think it at all necessary to go farther and examine the adjoining bone.

A suspicion of the stricter adhesion of the dura mater to the scull at the places of these sutures than every where else, the situation of what are called sinuses immediately under the sutures, and a fear that either high and dangerous inflammation must follow the violent detachment of a part of them, or that an unrestrainable and fatal hæmorrhage must ensue from a breach of those vessels which pass from the sinuses through the sutures, have deterred most of our ancestors from meddling with them, and induced them to deliver down to us frequent prohibitions against the application of perforating instruments upon them. Neither of these apprehensions are founded in fact, or in strict truth. The separation of the scull from the longitudinal sinus is not attended necessarily with any kind, or degree of inflammation peculiar to itself, or more than any other part of the dura mater;

nor is the laceration or breach of the communicating vessels between this sinus and the suture which covers it, necessarily followed by any such degree of hæmorrhage as to prove hazardous or alarming; as I have more than once experienced.

A perforating instrument most certainly ought not wantonly or unnecessarily to be set on this part; and this for a reason not drawn from any peculiar hazard attending such operation. The larger size, and greater number of vessels here than in other parts of the bone, will certainly cause such a degree of bleeding, or hæmorrhage, as though easily restrainable when the piece of bone is removed, may yet, in the act of perforation, considerably embarrass and perplex a young operator: it will therefore behove him, in general, to avoid comprehending the suture within his saw; but still it is right that he should know, that when particular circumstances render it absolutely necessary, such thing may be done very consistently with his patient's safety. Not only a part of the sagittal suture, covering the longitudinal sinus, may be removed with a trephine, if necessary, and no hazard be incurred from the breach of the attaching vessels; but a wound of the sinus itself is by no means *necessarily* attended with an unrestrainable or fatal hæmorrhage.

The very writers themselves, who are so apprehensive of a wound of this part, forget the relations they every now and then give us

of fragments of broken bone safely extracted from it.

A mistake concerning the nature of the sinuses was (I suppose) the foundation of these apprehensions. The idea which most of our ancestors had of the motion of the dura mater induced them to believe that, as the sinuses were composed of this membrane, a wound made in them, like a wound in an arterial tube, could hardly re-unite. It is now universally known that they are merely venal, and that there is no such impediment to the immediate coalescence of a wound in them, when it may happen to be accidentally inflicted.

CASE XXVII.

A BOY about eight years old, the son of a Jew merchant in the city, received a blow on his head with a stick from his tutor. The stroke made him giddy for a few minutes; but as no blood was shed, and the pain soon ceased, he concealed it till it was discovered by his barber that his head was swollen in that part. In the middle of the top of his head was a tumor, about the size of a common walnut: it was indolent, had a dull kind of pulsation, and palpably contained a fluid.

Mr. Serjeant Amyand and Mr. Shipton were joined with me. In their presence I divided the

tumor with a knife, and let out a quantity of fluid venal blood. When as much had been discharged as the tumor might be supposed to have contained, we were surprised to find the blood still continue to flow, plainly not from the wounded scalp, but from the bottom of the cavity.

Upon examination, it was found that the sagittal suture was broken, that a portion of the fracture was forced into the sinus, and that the blood issued by the sides of this fragment.

Extraction of this fragment was attempted, but to no purpose. By the direction of the consultants, I made a small perforation on one side of the suture; but when that was done, the point of the elevator could not be so introduced as to get the broken piece out. The trephine was then applied on the other side of the suture, and to the same effect, or rather no effect. The fragment was only capable of being extracted as it had gone in. At last, after much deliberation and conversation about the hazard of wounding a sinus (which was indeed already wounded by the broken bone), it was agreed to set a trephine on the suture, in such manner that the whole surface should be comprehended within its circle. This was done; but when the elevator was applied, the piece sawed came out in fragments, and left the one portion which had pierced the sinus still sticking in it. We were then necessitated to lay hold of it, and extract it with a pair of forceps. A flux of blood followed, but by the application of a small

dossil of dry lint, held on for a few minutes, it ceased, and never recurred. The patient is alive at the time of my writing this.

CASE XXVIII.

A GIRL about sixteen was knocked down by her mother with an iron poker of considerable weight; the latter immediately ran away, and the former was brought senseless to the hospital. She had a large wound on the top of her head, with a considerable fracture of the sagittal suture. The broken pieces were so large, and so loose, as to be easily removeable without any perforation. When they were taken away, the longitudinal sinus was left bare, at least two inches in length; but no hæmorrhage followed the removal of the fragments.

For three days she was bled twice a day, from one part or other of her, and stools were procured in such manner as was possible, but to no purpose; she still remained perfectly and absolutely senseless. On the fifth day, finding her still in the same state, and verily believing that nothing in art could at all serve her, I made an opening with a lancet into the longitudinal sinus, and suffered the blood to run off, until her countenance, which was much flushed, became pale, and her pulse, which till now had been full and strong, though labouring,

faultered considerably; in short, till she shewed as much as a senseless person could the marks of a deliquium from inanition. I then put a bit of lint on the orifice, and ordered the nurse to keep her finger lightly on it until I had visited the rest of the house. When I returned, the part shewed no disposition to bleed again, nor did it ever after. That afternoon she opened her eyes and moved her arms, and the next morning was sensible enough to ask for drink. She retained her senses for several days, but a fever coming on, she became delirious and convulsed, and died so on the seventeenth day from that of her admission into the hospital.

Upon examination, after death, a considerable abscess was found on the surface of the brain, on one side of the falciform process of the dura mater.

I should be very sorry to be so misunderstood, as to have it conceived that I have related these cases with a view to encourage the opening of a longitudinal sinus; that is far from my intention. I only mean, by adducing these instances, to prove that our fears of irremediable mischief from such wounds, whether accidentally or artificially inflicted, are not well grounded; and that we may, in some desperate cases, have recourse to such means as have been supposed to be either impracticable or unwarrantable. A surgeon should ever be cautious; but ill-grounded apprehensions will necessarily prevent improvements, and hinder us in some cases from attempt-

ing what may prove beneficial to mankind. Had every successor to Hippocrates been of his opinion, the operation of lithotomy had never arrived at its present state of perfection, and mankind had been suffered to languish under, and be destroyed by, a most tedious as well as excruciating malady.

SECT. V.

FRACTURES OF THE CRANIUM WITH DEPRESSION.

SIMPLE fractures of the scull, or those in which the parts of the broken bone are not depressed from their situation, differ from what are called fissures, only in the distance of the edges of breach from each other. When the separation is considerable it is called a fracture, when it is very fine and small it is called a fissure. The chirurgical intention and requisite treatment is the same in each, viz. to procure a discharge for any fluid which may be extravasated in present, and to guard against the formation or confinement of matter in future. But in fractures attended with depression, the intentions are more. In these, the depressed parts to be elevated, and such as are so separated as to be incapable of re-union,

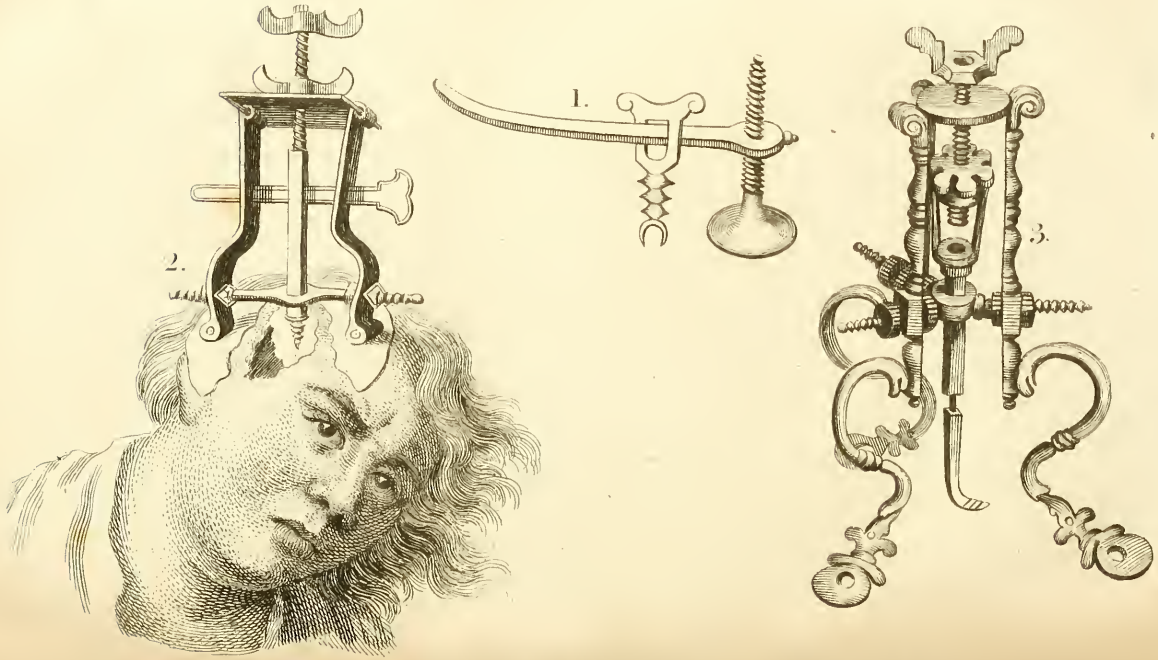
or of being brought to lie properly and without pressing on the brain, are to be totally removed.

These circumstances are peculiar to a depressed fracture; but although they are peculiar, they must not be considered as sole, but as additional to all those which have been mentioned at large under the head of simple fracture: commotion, extravasation, inflammation, suppuration, and every ill which can attend on or be found in the latter, are to be met with in the former, and will require the same method of treatment.

To free the brain from pressure, and to provide a free discharge for blood or lymph at present, or for matter in future, by elevating the depressed pieces, and by removing such as were loose, was as well known to the ancients to be the proper curative intentions, as they can be to us; but the means which they made use of in order to accomplish these ends were somewhat different to what are now used, and laboured under some inconveniences which later practitioners have corrected. This difference it may be worth while to inquire into.

Most of the attempts made by our ancestors, for the elevation of depressed parts of the cranium, were made by the application of instruments to the parts so depressed. This was a palpable imperfection to say no more of it; but this was not all; for the instruments which they made use of on these occasions were not only to be fastened to the depressed

part of the bone, but required also some degree of force to be used in fastening them to such part. The troclea tripes, the troclea bipes, and all the pieces of machinery designed by Albucasis, Guido, Andreas a Cruce, Fabritius ab Aquapendente, Pare, and Scultetus, as well as those delineated by Hildanus and Peter Paaw, are proofs of this: they all require a perforation to be made in the depressed piece, either by or for the screw with which it is to be elevated. Now, not to mention that most of these instruments were so complex as to render them extremely aukward and unmanageable, it is obvious, that by the application of any of them to the depressed pieces (especially if they were loose), all the ills arising from pressure made on the parts underneath must be increased; and that in many cases they could not be used at all. Celsus has indeed directed the meningophylax to be used as an elevator; which instrument differs but little from the elevator used at present, either in form or manner of application; but then the opening through which it is to be introduced is to be made either with the terebra or the cyliscos, the inconveniences of which have already been remarked. In short, all the objections which the old perforating instruments were liable to in simple undepressed fractures being of still greater force in fractures with depression, and the application of any kind of instrument whatever to the outer surface of a depressed or loose piece of scull being palpably wrong, and liable



1. *Elevatorium simplex.* 2. *Trochlea bijas.* 3. *Trochlea trijas, of the Antients.*

to hazard, the present practitioners are certainly vindicable in having laid them all aside, and in having endeavoured to accomplish the same end by means which are less hazardous and less operose. The trephine is (as I have before observed) the only perforating instrument used by the best of the present practitioners in England[u]: with this, an opening is made in the sound undepressed part of the cranium, and through such opening an instrument called from its use an elevator is introduced. This perforation should either comprehend the border of the fracture where that is possible, or if that cannot conveniently be done, should be made as near to it as possible, for reasons too obvious to need recital. What number of perforations may be necessary can only be determined by the particular circumstances of each individual case: all the intentions which may arise from extravasation of fluid, or probability of suppuration, as well as those from the depression of bone, must be fulfilled, or the work will be left imperfect, and little chance of good will attend it.

[u] M. Savigny, in his work on Chirurgical Instruments, has exhibited a trephine on a new and improved construction, which is divested of lateral teeth, and made on the same principles as the amputating saw; it certainly performs its office with celerity and neatness, and with less exertion to the operator than that before in use. The perforator having sufficiently fixed the saw in the circle, is by a contrivance made to retire, which precludes the necessity of removing it by means of a key. E.

When the whole disease seems to consist in the mere depression of the bone, and what symptoms attend seem to proceed from that alone, the elevation of such portion may procure immediate remission of such symptoms, and afford a reasonable prospect of success. But as the injury is not always of so simple a nature, as other parts are so frequently hurt and other mischief done by such great violence, the remission, or disappearance of such symptoms as arise merely from such pressure, cannot be a sufficient warrant, either for promising or for expecting success. The dura mater under the depressed piece, or even in another part of the head, may have been so hurt as to become inflamed, and to suppurate; the symptoms of which will not appear immediately, nor in general until some time is past: but, however late they may come on, they will not therefore be the less certain or the less hazardous. The early attack of those which are caused by extravasated fluid or depressed bone, do by no means preclude the later accession of such as arise from inflammation and putrefaction. The depressed piece of bone does most certainly require our immediate help, but the assistance lent to that, however proper and effectual, does not render it at all less necessary to guard against such ill as may most reasonably be expected to proceed from violence sustained by the parts underneath. A blow, which has been sufficient to break and depress a portion of the scull, very frequently does such damage to the tender

vessels which communicate between that bone and the meninges, as to be the cause of much more, as well as greater ill, than what is deducible from the mere fracture; and consequently, although the elevation of the bone is *one* very necessary part of a surgeon's business in these cases, yet it is very far from being *all* that he has to do. All the ills which may be apprehended from every other possible effect of such violences, are to be feared and guarded against, and that full as much in the fracture with depression, as in that without.

This is a part of practice which ought to be very carefully attended to. The generality of writers have contented themselves with directing us to raise up the depressed parts, and thereby to endeavour to remove such symptoms as are caused by the mere pressure which the bone makes on the brain; but have either totally neglected, or very slightly passed over, what is of full as much consequence to the patient; I mean the injury which is most frequently done to the membranes of the brain, and which, if neglected, will certainly produce that fever, and those symptoms, which so often baffle the whole power of medicine.

The combination of different ill effects, proceeding from the same primary violence, and concurring in the same subject, together with the great difficulty of distinguishing them from each other, is one of the principal causes of that perplexing uncertainty attending wounds of the head. When one cause of bad symptoms

has been removed, another, or even several others, may still remain, each of which singly may be sufficient to destroy the patient; and therefore, although the means first made use of may have been such as have been pointed out by the earliest and most alarming symptoms, and extremely proper for the relief of such complaint, had it been the only one the patient laboured under, yet in the case of a complication, by not being sufficient to answer every requisite intention, they very often answer none at least not effectually; and producing only a temporary and partial relief, prove a greater aggravation of our disappointment.

This every practitioner should know, and this the friends of every patient should be made acquainted with, lest the former, being deceived by an appearance of amendment, be induced to promise what it will not be in his power to perform; and the latter, having had their hopes exalted, should be the more severely hurt by their disappointment.

If the fracture be but small, the depression little, and the force with which it was produced not great, the elevator introduced through the perforation may be sufficient to set it to rights; and if there be no urgent symptoms, nor any mischief done to the internal parts, may be sufficient for all purposes. But if the force was great, if the symptoms are immediate and pressing, if the fracture runs in a form inclined to a circular one, or if the depressed piece be cracked all round, the best and safest way is to

remove the whole, or greater part, of the portion so depressed and circumscribed.

To those who are unused to things of this sort, so large an opening as such method of acting must make will have a very tremendous appearance; and they may be inclined to suspect much hazard and inconvenience from laying bare so large a portion of the dura mater; but let all such remember, that however large the quantity of membrane may be which shall be thus denuded by the operation, yet the same quantity at least, most probably a much larger, would, in all likelihood, become inflamed, and generate matter on its surface; which matter, for want of a timely, ready, and sufficient outlet, would do considerably more mischief than the mere detection of the said membrane can do.

In cases where the broken pieces of a depressed fracture are widely separated from each other, and some of them a good deal loosened, the expediency and the propriety of removing such pieces is acknowledged by every body; but few people attend to the reason, or inquire why such practice is just and proper; if they did, they would also see that the free removal of bone was equally proper in the case of great violence, as in that of loosened or widely separated pieces. In the latter the broken parts are removed, because their reunion with the rest of the cranium, and the preservation of the attachment of the dura mater to the inner surface of them, is thought impossible, or at least highly improbable; and that therefore they

must be in the way, and hinder the free discharge of matter from the suppurating membrane. And is not the same inconvenience full as likely to attend the former? Is it the violence done to the bone, and through it to the membrane, which causes the inflammation and suppuration? Or is it the loosened or separated state of the broken part? If it be the former (as it most undoubtedly must be), the same precautions, the same method of treatment must be equally necessary in the one as in the other; the reasons, the intentions, are the same in each; and if the conduct be not the same the patient will suffer.

The peculiar circumstances of each individual case must furnish direction to the practitioner for his particular conduct. Rules to be laid down by a writer on such subject can be only general. The parts which are depressed must be elevated; such as are loose and cannot be brought to lie even, such as cannot be prevented from pressing on the membrane, or such as wound and irritate it, must at all events be taken away; the free discharge of blood or lymph in present, and of matter in future, must be provided for; and therefore every symptom and appearance must carefully and early be attended to, lest the most proper opportunity of giving assistance be not embraced.

The circumstances just mentioned are such as cannot be neglected but at the risk of the patient; and therefore the prohibitions which

our forefathers have delivered down to us, with regard to the parts of the scull on which they say we ought not at any rate to apply our perforating instruments, must be received with some limitation.

The places forbidden as improper are, the sutures, the lower part of the os occipitale, the ossa temporum, and that part of the os frontale where the sinuses are situated.

That a trephine may without hazard be applied on a suture, I have already said. When it may with equal utility be set on any other part, the sutures should undoubtedly be avoided, and that for a good reason, exclusive of any peculiar hazard: but that part of a suture may (the case requiring it) be safely removed, is true beyond all doubt. That many of the old practitioners were very apprehensive of mischief from hence, is not to be wondered at by any body who considers their idea of the nature of the subjacent sinuses, and the strange unmanageable instruments with which they operated. Not that there are wanting old writers who have held the doctrine of operating on a suture, when necessary, very defensible; among whom is J. Baptist. Cortesius.

Perforation of the temporal bones has been forbid, both on account of the artery and the muscle which are on its surface; unrestrainable hæmorrhage having been dreaded from the one, and fatal convulsion from the other: but experience may convince us, that neither of these apprehensions are strictly just. The temporal

artery, when divided, is often capable of being restrained by compression, and always by ligature; and that fatal convulsion, which is vulgarly called the lock-jaw, though it produces one of its most striking and most visible effects on these muscles, is not necessarily produced by a wound of either of them, more than by a wound of any other. In short, the upper part of the temporal bones may be laid bare, if necessary, by an incision made through the muscles covering them; and may also be perforated. Such operation does not indeed often prove successful; but the failure of success does not proceed from the nature of the parts operated upon, but from a circumstance of much more consequence, and generally without remedy; which is, that in these fractures the breach is most commonly continued on to the basis of the scull, and is also most frequently attended by a large extravasation within or under the brain and cerebellum[x].

When the depressed parts have been raised up, the loose ones removed, extravasated fluid discharged, the brain freed from pressure, and way made for the free exit of whatever may be formed or collected, the bare dura mater should be dressed as easily and lightly as possible. Our

[x] Whoever will examine the disposition of the temporal muscle, will see, that its aponeurosis covers a very considerable part of the inferior border of the os parietale; and consequently, that such part of the bone can never be laid bare without a division or removal of a part of the said aponeurotic expansion.

ancestors had a multiplicity of medicaments, which they used upon these occasions, and were very precise in suiting them to the different states (as they called them) of the sore and membrane. They were also very exact in making and applying those pieces of linen or of silk, called sindons, which they used to imbue with the said remedies, and dress the bare dura mater with. I have taken no notice of either, because I verily believe that the majority of the former were absolutely useless, and that the very exact application of the latter was prejudicial, by confining, in some degree, what ought to be discharged with the utmost freedom

Wounds of the brain, among writers on this subject, have also generally made a distinct chapter; but the treatment of them is so very little different from those which have been already related, that they may fairly be comprehended under the same article.

The brain is wounded either by the instrument or body whereby the scull is broken, or by broken parts of the cranium; foreign bodies also, such as bullets, splinters, parts of weapons, wadding of fire-arms, &c., are sometimes lodged in it; but let the wound or fracture be what it may, or whatever other circumstances may happen to attend, the chirurgic treatment is short and plain; viz. to remove all such parts of the broken scull, as may press, wound, or irritate the brain or its membranes; to take away all such extraneous bodies, as can easily, and without violence, be got at and extracted; and to

make such an opening, as may most conveniently serve the purpose of discharging blood, serum, or matter, either in present or in future. When all these things have been done, and the patient has been put under a proper regimen, both of diet and medicine, the surgeon has done his duty, and may say with Mr. Pope—

"Thus far was right; the rest we leave to heaven."

For with regard to the dressings proper in these cases, they are not at all different from those which ought to be used, where neither the brain nor its meninges are hurt. They should be soft, light, and not consist of any thing greasy, or which can possibly irritate or inflame; nor should they be applied in such manner or quantity as to press or obstruct the free discharge of fluids of any kind. Soft dry lint is perhaps equal to any or all others. In the chirurgical writers are to be found a great many formulæ: but whoever places confidence in them, for any supposed merit of their own, will find himself much disappointed.

I cannot quit this subject, without making a short remark on the bandages most frequently advised, and used in wounds of the head.

In all the writers on the subject of fasciæ, are to be found descriptions and delineations of those which are said to be most proper for the head. On paper they are neat and elegant, in the application they require a small degree of practice and dexterity, and when applied

nicely may impose on the ignorant, and on those who have not seen much of, or reflected much on, their inconvenience. They press, heat, and painfully confine the head, even when applied in the best and most ingenious manner; and when put on aukwardly or negligently, are still more troublesome, and less serviceable. All that can ever possibly be wanted in these cases from bandage must be, merely to keep the dressings in their place without any degree of confinement or pressure,; and this purpose will always be better accomplished by a loose cotton or yarn night-cap, than by the nicest and most elaborate bandage that ever was invented[y].

[y] "On this subject I was very glad to find so very good a judge as Oribasius of the same opinion.

"Hæc autem omnia non fasciis continentur, propter pondus, "sed velamento, ut cohibeantur, neque cerebri membrana "gravatur; ac velamenti media pars, quæ terebrato respon- "det, forfice exciditur, ut apertum fiat, atque in illud spa- "tium cana mollis, in extremis constricta, duplex inditur," &c.

"Plerique omnes non alia vinctura terebratos deligant; sed "sola redemiculi circumductione contenti sint. Quinetiam "ipsa quoque ulcera extra terebrationem, quoad fieri potest, "conari debemus sine fasciis curare; non modo quia gravan- "tur compressis iis quæ sub vinculis imposita ipsis fuerant, "verum etiam quia plus quam par est calefaciunt. Etenim "quod in aliis partibus vinctura, id in capite positio præstabit, "ideo deligare supervacaneum erit."

Oribasius *De fract. ex Heliodoro.*

CASE XXIX.

A GIRL, about fifteen years old, crossing Smithfield on a market-day, was tossed by an ox, and fell with her head on the flat stones within the posts. As her dress was mean, and nobody knew any thing of her, she was brought senseless into the hospital. She had a large bruise on the right side of her head, through which I plainly felt a fracture with depression. The scalp being removed from that part, the fracture was found to be large, and the depression considerable; it traversed the os parietale from before backward, in its middle part between the sagittal and temporal sutures, and the depression was of the upper part of the bone. I applied a trephine on the inferior and undepressed part, and by means of an elevator raised the whole to a perfect equality. Her head was dressed lightly, and sixteen ounces of blood were taken from her. She passed the following night very unquietly, and the next morning was still senseless. She was again freely bled, and a purge was given, which soon operated. On the third day, her pulse admitting, and her circumstances requiring it, she was bled again. On the fourth day she became sensible, and on the fifth was surprisingly well. She remained so until the ninth, on the evening of which she complained of head-ach, sickness, and giddiness. She was again let blood, and put under the direction of

the physician, who ordered some medicines for her. From the ninth to the thirteenth day, she remained much the same; that is to say, feverish, and complaining of heat, thirst, head-ach, and watching. On the fourteenth she had a severe rigor, and the sore on the scalp as well as the denuded dura mater wore a very bad aspect. From this time she became daily worse and worse, in every respect; and on the twentieth day from that of the accident, she died, having been terribly shaken by spasms for several hours.

All the internal surface of the os parietale above the fracture was detached from the dura mater, and covered with matter, which could not obtain free discharge at the perforation, the membrane being inflamed and thrust up tight against it.

I will not pretend to assert, that repeated perforation of the upper part of the bone would have preserved her; but I must say, as the case turned out, it would have been her best, if not her only chance; and that, if I had known at that time as much of these cases as I think I have since learned, I should certainly have taken away the greatest part, if not the whole of what had been depressed.

CASE XXX.

A GENTLEMAN's servant riding carelessly and hastily through London, was thrown from his horse, and struck his forehead against a sharp

stone. There was a considerable wound on the scalp, and a fracture, with depression of the os frontale. The man was perfectly deprived of sense, the bone was considerably depressed, and a large quantity of blood issued from underneath the depressed part. A trephine was applied on the undepressed part, and the elevation accomplished; he was let blood freely, and dressed lightly. On the second and third days he was let blood again. On the fourth he recovered his senses, and from that day to the ninth seemed to go on well. On the ninth in the evening he complained of pain and lassitude, and was ill that night and all the next day. On the eleventh he was worse, and (to use his own words) said, his brains were bound round with a fillet, like a collar of brawn. His pulse was hard, frequent, and jarring, his skin hot, and he got no sleep at all. As the man was evidently and hastily getting into a hazardous state, I was determined to try what a free removal of bone would do; and with a large trephine took away almost the whole of what had been depressed. The dura mater was not purulent, but dull in colour, and smeared over with what Morgagni says is gelatinis instar.

He was again and again let blood, as his pulse would bear, and the physician ordered proper medicines for him. For four days from this time he continued much the same, but after that every thing changed for the better; he took the cortex freely, and in about three months was discharged well.

As I would not pretend to assert, that removal of more bone would have proved successful in the preceding case, so neither will I say that the recovery of this man was owing to it. I can only say, I verily believe both, and that I am sorry I did not make the same experiment in both. The cases were materially similar; and the analogical is the only method we have of reasoning on subjects like this, wherein we cannot have demonstration.

CASE XXXI.

A BOY about fourteen years old, following a led horse, was desired by the servant, in whose hand the horse was, to strike him; the boy did so, and received a blow from one of the horse's heels, which brought him to the ground senseless. He had on the upper and middle part of his forehead a large wound, which disclosed a considerable fracture, with depression.

The fracture ran nearly in a transverse direction across the bone, and the depression was of the upper part. A trephine was applied, an elevator introduced, and the depressed part of the bone with some difficulty made to lie even. The head was dressed lightly, and the boy was let blood largely. He continued senseless all that night, was let blood twice the next day, and had a purge and a clyster. On the fourth day he showed some signs of sense; and in two more, being again let blood and kept very low,

was quite sensible. From this day until the fourteenth, every circumstance was promising, but on that day he again became ill; his pulse from this time was hard and quick, and, in short, he had for three or four days all the symptoms of mischief under the cranium. On the nineteenth I made a large perforation in that part of the bone which had been depressed and elevated, and gave discharge to a very large quantity of offensive matter. On the twenty-second he became delirious and convulsed, and on the twenty-third he died.

I removed all the upper part of the cranium, and found the dura mater altered in colour, and separated from the whole frontal bone, from the fracture quite up to the sagittal suture; and under the said membrane, matter to the quantity of about half an ounce.

CASE XXXII.

The following case was sent me by a very ingenious practitioner at some distance from London, and may, among others of like sort, serve to prove that it is not merely the formation of matter between the scull and dura mater, but also the confinement of it there, which are the joint causes of the bad symptoms, and of the hazard.

A boy fell from a cart loaded high with hay, and pitched perpendicularly on his head. The blow stunned him for a few minutes, but he

soon got up again, said he was not hurt, and walked home with the cart.

As he made no complaint at home, his master took no farther notice of his fall, and the boy followed his daily labour in the farmyard.

At the end of a fortnight he came to my friend, and desired him to look at the swelling on the upper part of the right side of his head. The tumor appeared to be full of matter, and the surgeon divided the scalp, and let out a considerable quantity. He passed his finger in, in order to examine whether the cranium was bare or not, and was not a little astonished to find it not only bare but considerably broken. He removed the tumid portion of the scalp; and having so done, found the distinct pieces of bone so loose as to be taken away without any resistance, and so large as together to make nearly a third part of the parietal bone. The dura mater under them was clean, and well incarned.

The boy had no one bad symptom from first to last, came to the surgeon's house every day to be dressed, and was also in the farmyard daily.

SECT. VI.

EXTRAVASATION AND COMMOTION.

GREAT and hazardous as the evils are which proceed from fractures of the scull, they do not exceed those which are caused either by the extravasation of fluids within its cavity, or by the concussion or derangement of the substance of the brain; whether we regard the difficulty under which a practitioner labours in forming a judgment of the true nature of the case, or the uncertainty, or the frequent fatality of the event.

The shock which the head sometimes receives by falls from on high, or by strokes from ponderous bodies, does not infrequently cause a breach in some of the vessels, either of the brain or its meninges; and thereby occasions extravasation of the fluid, which should circulate through them. This extravasation may be the only complaint produced by the accident; or it may be joined with, or added to, a fracture of the scull. But this is not all; for it may be produced not only when the cranium is unhurt by the blow, but even when no violence of any kind has been offered to or received by the head.

Vertigo, vomiting, stupidity, hæmorrhage, loss of sense and motion, either partial or total, are the symptoms of this kind of mischief;

sometimes one, or more, sometimes all, in the same subject. These symptoms, which are all easily accountable for from extravasation of fluid, and unnatural pressure made on the brain and nerves, are, as I have already at large remarked, frequently mistaken as indications of a disease which, considered abstractedly, can never cause them; I mean a simple undepressed fracture of the cranium: it may be accompanied by them, but cannot cause them.

When a fluid is extravasated in any considerable quantity within the cavity of the cranium, if any bad symptoms are produced by it at all, they are, and must be, such as indicate pressure made on the brain and origin of the nerves; occasioning thereby either disturbance or abolition of the offices of sense and motion; and this in different degree, according to the quantity, kind, and situation of the pressing fluid; and to these are sometimes added hæmorrhage from the nose or ears. Thus far, I think, we may pronounce positively; but to our very frequent mortification, we find these are the only circumstances which in such case we can depend upon, every thing else which relates or belongs to them being involved in a most perplexing obscurity. We not only have no certain infallible rule whereby to distinguish what the pressing fluid is, or where it is situated, but we are in many instances absolutely incapable of knowing whether the symptoms be occasioned by any fluid at all, for a fragment of bone, broken off from the internal table of the cranium, and making an equal

degree of pressure, will produce exactly the same complaints.

Sometimes indeed the case is otherwise; and, from concomitant appearances, the true nature of the disease may with some degree of certainty be known; but this does not happen very often.

Many of our ancestors, when no fracture was discoverable in the cranium of a person labouring under such symptoms as have been mentioned, in consequence of violence offered to the head, contented themselves with calling the case a concussion; and although they had no very precise idea annexed to the term, yet they seldom went farther for a solution: like teeth and worms in infants, or like nerves in women, it satisfied ignorant inquirers. The cranium was not broken, the mischief was out of sight, most probably out of reach, and they had not often the curiosity or the anatomical judgment to examine after death into the real state of the case.

That a concussion or commotion of the substance of the brain is a circumstance which frequently happens, is a truth beyond all doubt; and that it is often the cause of death, is as true; but that many of the cases which, the scull being found not broken, have passed for concussions, have been really produced by very different causes, has often been incontestibly proved by the examination of such persons' heads after death; where such extravasation of blood or lymph, or both, have been found, as would fairly and rationally account, both for the symptoms and for the event.

A concussion and an extravasation are very distinct causes of mischief, though not always very distinguishable.

M. Le Dran, and others of the modern French writers, have made a very sensible and just distinction between that kind and degree of loss of sense which arises from a mere commotion of the brain, and that which is caused by a mere extravasation, in those instances in which the time of the attack or appearance of such symptoms are different or distinct. The loss of sense, which immediately follows the violence, say they, is most probably owing to a commotion; but that which comes on after an interval of time has past, is most probably caused by extravasation.

This distinction is certainly just and good, as far as it will go. That degree of abolition or diminution of sense, which immediately attends or follows the blow or fall, and goes off again without the assistance of art, is in all probability occasioned by the sudden shake or temporary derangement of the contents of the head; and the same kind of symptoms recurring again some time after they had ceased, or not coming on until some time has passed from the receipt of the violence, do most probably proceed from the breach of a vessel within or upon the brain. But unluckily we have it not very often in our power to make this exact distinction. An extravasation is often made so immediately, and so largely, at the instant of the accident, that all sense and motion are

instantaneously lost, and never again return. And it also sometimes happens, that although an extravasation may possibly not have been made at the moment of the accident, and the first complaints may have been owing to commotion merely, yet a quantity of fluid having been shed from its proper vessels very soon after the accident, and producing its proper symptoms, before those caused by the commotion have had time to go off, the similarity of the effects of each of these different causes is such, as to deprive us of all power of distinguishing between the one and the other, or of determining with any tolerable precision to which of them such symptoms as remain are really owing.

When an extravasation of any kind is made, either upon or within the brain, if it be in such quantity, or so situated, as to disorder the economy of the animal, it always produces such disorder, by making an unnatural pressure on the parts where it lies. The nature and degree of the symptoms hereby produced are various and different in different persons, according to the kind, quantity, and situation of the pressing fluid. Sometimes it is mere fluid blood, sometimes blood in a state of coagulation; sometimes it is a clear lymph, and at others blood and water are found mixed together: each of these is found either simple or mixed in different situations; that is, between the scull and dura mater, between the dura and pia mater, or in the natural cavities of the brain called its ventricles, and sometimes, in cases of great

violence, they are found at the same time in all these different parts. Sometimes a considerable quantity is shed instantly, at the time of the accident; and sometimes the breach by which the effusion is made is so circumstanced, both as to nature and situation, that it is at first very small, and increases by faster or slower degrees. In the former, the symptoms are generally immediate and urgent, and the extravasation is of the bloody kind; in the latter, they are frequently slight at first, appear after some little interval of time, increase gradually till they become urgent or fatal, and are in such case generally occasioned by extravasated lymph. So that although the immediate appearance of bad symptoms does most certainly imply mischief of some kind or other, yet, on the other hand, no man ought to suppose his patient free from hazard, either because such symptoms do not show themselves at first, or because they appear to be but slight: they which come on late, or appearing slight at first increase gradually, being full as much to be dreaded as to consequence, as the more immediately alarming ones; with this material difference between them, that the one *may* be the consequence of a mere concussion of the brain, and may by means of quietude and evacuation go quite off; whereas, the other being most frequently owing to an extravasation of lymph (though sometimes of blood also), within the substance of the brain, are very seldom removed by art.

Extravasations of any kind, and wherever situated within the cranium, are very hazardous, and much more frequently end fatally than happily; but considered as relative to the art of surgery, that which consists of merely fluid blood situated between the cranium and dura mater is certainly the best, as it is the nearest to the surface, and admits the greatest probability of being relieved by perforation of the scull: grumous or coagulated blood, although in the same situation, by being most frequently adherent to the membrane, is not so readily discharged as the preceding, and therefore more likely to prove destructive: and all those which are either under the meninges, or within the cavities or substance of the brain, as they are very seldom within our exact knowledge, so they are also generally beyond the reach of our art.

The method of treating people under these unhappy circumstances is somewhat different, according to the supposed or most probable nature of the complaint, and according to the symptoms and appearances which it produces, or which accompany it. When the symptoms which imply a pressure made on the brain or nerves have been occasioned merely by a shake or concussion, and neither blow nor other external violence has been offered to or received by the head, we have no rule whereby to form any other than a general opinion; no mark which can point out to us, either the precise nature of the disease, or its particular situation; consequently we have no direction from what part of

the head to remove the scalp, or where to apply a perforating instrument, and therefore no warrant for perforating at all. In this case, the only chance of relief is from phlebotomy and aperients; by which we may hope so to lessen the quantity of the circulating fluids, as to assist nature in the dissipation or absorption of what has been extravasated. This is an effect which, although not highly improbable in itself, yet is not to be expected from a slight or trifling application of the means proposed. The use of them must be proportioned to the hazard of the case. Blood must be drawn off freely and repeatedly, and from different veins; the belly must be kept constantly open, the body quiet, and the strictest regularity of general regimen must be rigidly observed. By these means, very alarming symptoms have now and then been removed, and people in seemingly very hazardous circumstances have been recovered. Instances of these successes are not indeed so frequent as we could wish, but they have been sufficiently so to warrant the attempt, especially in cases where there are no indications to authorise the use of any other. But when the symptoms of extravasation are the consequence of such external violence as leaves a mark where it was inflicted, and when the scalp is so bruised or wounded as to shew the place where, we then have some degree of assistance, both in forming a judgment of the most probable nature of the complaint, and in using the means most likely to prove successful in its relief. For if the

effusion has been the consequence of the stroke which the head has received, and such effusion is made immediately under the part so stricken, the perforation of the cranium in this place may give discharge to the extravasated fluid; and the wound or bruise in the scalp shows us the point from whence we ought to remove a portion of it, in order to perforate the cranium. This I say is sometimes the case, and the consequence is sometimes so fortunate that we save a perishing patient. But, although it does now and then happen that we succeed, yet such success is by no means certain or to be depended upon. Ever thing relative to this kind of disorder is fallible and uncertain; and though the extravasation be sometimes found immediately under the external mark, yet it often happens that it is not, and that the effusion is made in a part distant from that mark, and to which we have nothing to lead us. Upon the whole, although a bruise or wound of the scalp does not in these cases necessarily or certainly point out the seat of an extravasation, yet when bad symptoms urge, and evacuation has been fully and unsuccessfully tried, such mark may be deemed a sufficient though not unerring authority for making farther inquiry, by removing the scalp and perforating the cranium: for this is a kind of case in which we are not to expect certainty, and in which we must be content with such information as we can obtain. The opportunities which we have of being serviceable are but few; we should therefore suffer none to

escape, but embrace even possibility. The general advice given by Fabritius ab Aquapendente[z] is applicable to no part of surgery more than to this; in which the loss of a very short space of time is often absolutely irretrievable.

If the extravasation be of blood, and that blood be in a fluid state, small in quantity, and lying between the scull and dura mater, immediately under or near to the place perforated, it may happily be all discharged by such perforation, and the patient's life may thereby be saved; of which many instances are producible. But if the event does not prove so fortunate, if the extravasation be so large or so situated that the operation proves insufficient, yet the symptoms having been urgent, general evacuation having been used ineffectually, and a wound or bruise of the scalp having pointed out the part which most probably received the blow; although the removal of that part of the scalp should not detect any injury done to the bone, yet the symptoms still subsisting, I cannot help thinking, that perforation of the cranium is in these circumstances so fully warranted, that the omission of it may truly be called a neglect of having done that which might have proved serviceable, and, *rebus sic stantibus*, can do no harm. It is very true, that no man can before-

[z] "In vulneribus quæ natura sua admodum periculosa sunt, "pessimum est expectare prava symptomata; et tunc demum "providere, cum forsitan occasio præteriit, nec amplius pro-"videre licet." FAB. ab AQUAPENDENTE.

hand tell whether such operation will prove beneficial or not, because he cannot know the precise nature, degree, or situation of the mischief; but this uncertainty, properly considered, is so far from being a dissuasive from the attempt, that it is really a strong incitement to make it; it being full as impossible to know that the extravasated fluid does *not* lie between the scull and dura mater, and that under the part stricken, as that it *does;* and if the latter should be the case, and the operation be not performed, one, and most probably the only means of relief, will have been omitted.

Morgagni, in his book de Causis et Sedibus, &c. has treated this subject expressly, and has enumerated all the objections which may be made to the perforation of the cranium, in the case of effusion of fluid within it[a]; but among

[a] " Nam ut signa sint, ex quibus liceat suspicari sanguinem " intra calvariam esse effusum, quis scire pro certo possit, an " re vera; et si hoc etiam sciret, in quam partem effusus sit, " et quod consequitur, ubi et sit perterebrandum," &c.

" Nam pretur unum, qui majorem fortasse exterius dolorem " moveat, alia esse possunt loca, sub quibus majus revera " lateat internum vitium.

" In cognoscendo quam fallaces sæpe sint conjecturæ, vel " hinc apparet, quod et si pars ipsa icta, ab ægro indicatur, " imo ecchymosi et tumore se ipsam præclare indicet, non raro " tamen casus incidunt, in quibus alia pars sit contusa, alia " in quam effusio facta sit.

" Satis jam superque intelligis casus incidere, in quibus aut " nulla, aut tam levia, inter initia se offerunt, effusi intra " cranium sanguinis signa, tot autem, et tam gravia post " longum intervallum confestim se ingerunt, ut neque primo

others he has mentioned a popular one, which prevails much among his countrymen; viz. the fear of having been thought to have destroyed those, whom in the nature of things they could not save, "ne sic occisi, qui servari non potu-"erant, viderentur." With all possible deference to so able a man, I must say, that this does not seem to me to be by any means a good reason, or one which ought to be formed into a maxim for practitioners: it is founded on the weakness and incapacity of those who pretend to judge of what they do not understand, and therefore should never be embraced through a self-interested principle by those who know better. If such rule were universally admitted, we should often be prevented from embracing a critical opportunity, or using what in many cases is the *unicum remedium*, not only in this disease but in many others. The case of Ptolemy, cited by him from Livy, although brought as a strong corroboration of his own opinion, really can prove nothing, unless it could be made to prove that terebration was the cause of, or at least accelerated, the patient's death; which it can by no means be made to do. No man, who is at all acquainted with this subject, will ever venture to pronounce or promise success from the use of the trephine, even in the most

"illo opportuno tempore æger ex timore periculi, ut terebram "admittat, neque extremo sperare possent medici, opem se "per eam allaturos, tam longo spatio et tam perniciosis "indiciis extantibus." MORGAGNI *De Causis et Sed. Morbor.*

apparently slight cases; he knows that honestly he cannot: it is enough that it has often been successful where and when every other means have failed. The true and just consideration is this: Does the operation of perforating the cranium in such case add at all to that degree of hazard which the patient is in before it is performed? or can he in many instances do well without it? If it does add to the patient's hazard, that is certainly a very good reason for laying it aside, or for using it very cautiously; but if it does not (which I verily believe), and the only objection made to it is, that it frequently fails of being successful, surely it cannot be right to disuse that which has often been not only salutary, but the *causa sine qua non* of preservation, merely because it is also often unsuccessful; that is, because it is not infallible.

I should be extremely sorry to say any thing which might mislead my reader, but I cannot help thinking, that dark and obscure as this part of surgery is, yet there are sometimes appearances and circumstances, which may be said positively to indicate the fitness of the operation, among which I reckon the spontaneous detachment of the pericranium from the scull, in consequence of a heavy blow, attended with symptoms of stupefaction or loss of sense.

Whenever the dura mater is separated from its attachment to the inner surface of the cranium, the pericranim covering the outer part of the same bone is generally detached also.

When this separation is produced by the formation of matter, in consequence of inflammation, the tumefaction of the scalp, which denotes this effect, appears some days after the violence has been received, and is always accompanied with a symptomatic fever. The effusion of a considerable quantity of extravasated blood on the surface of the dura mater, as it absolutely separates that membrane from the bone, and cuts off all communication between that part and the scalp, so it does in the same manner oblige the pericranium to quit its attachment to the scull, of which I have remarked frequent instances, and I have also most frequently observed, that the blood in such cases has been coagulated, and very adherent to the membrane. Now if this observation should be found to be most frequently true, that is, if a detachment of the dura mater from within the scull, by means of an extravasation, be found to be most frequently accompanied by a detachment of the pericranium on the outside, have we not thereby an indication both why and where we ought to perforate? The operation *may* not be successful, but desperation cannot be submitted to while there is the most extreme degree of *probability* of being serviceable.

A free discharge by means of it may produce a cure, or it may prove only a temporary relief, according to the different circumstances of different cases: the disappearance or even the alleviation of the most pressing symptoms is undoubtedly a favourable circumstance, but is not

to be depended upon as absolutely portending a good event; either a bloody or limpid extravasation may be formed or forming between the meninges, or upon or within the brain, and may prove as certainly pernicious in future as the more external effusion would have done had it not been discharged; or the dura mater may have been so damaged by the violence of the blow as to inflame and suppurate, and thereby destroy the patient. The complaints arising from extravasation, and from suppuration, are (as I have already at large observed) very different and distinct from each other; the former may be relieved, or even totally removed, and the latter not prevented, nor indeed be capable of prevention: of this every practitioner should be aware, lest he expect and promise too much.

The nearer the extravasated fluid lies to the cranium the better; therefore that which is situated between the scull and dura mater is, cæteris paribus, the most favourable of any. If the disease lies between the dura and pia mater, mere perforation of the scull can do nothing; and therefore, if the symptoms are pressing, there is no remedy but division of the outer of these membranes. The division of the dura mater is an operation which I have several times seen done by others, and have often done myself; I have seen it, and have found it now and then successful; and from those instances of success, am satisfied of the propriety and necessity of its being sometimes done: but let not the practitioner, who has not had frequent oppor-

tunity of seeing these kinds of things, presume, from the light manner in which this necessary operation has been spoken of by a few modern writers, that it is a thing of little consequence; for it most certainly is not. Wounds of the membranes of the brain, by whatever body inflicted, or in whatever manner made, have always been deemed, and (which is more to the purpose) have always been found to be hazardous. There is indeed some difference between a wound made by a clean lancet or knife, and one made by bone, bullet, or any thing which bruises or tears: but this relates only to the manner: the part wounded is the same in all; and whether the dura mater be divided by a lancet, or by a fragment of bone, or any other body, it is equally divided, and the air is let in in the same manner on the pia mater, or brain, which become thereby subject to all the ills which such wound, or such exposition, are capable of causing.

Authors indeed do every now and then tell us strange stories, and give us strange accounts of incisions made into the meninges and brain in search of foreign bodies, of extravasated fluids, &c.: but let the young practitioner read these relations with some reserve of faith, and recollect that the excellent advice given by a very able man, "Homines non admiratione afficere, sed "eis utiliora docere," is not always attended to by writers. Caution and fear are different things; where any good can be done, it ought to be attempted by every practicable and justifiable

means; but where no good is reasonably to be expected, there is no warrant for doing any thing. The division of the dura mater I have seen to be necessary, and I have seen it to be successful: but all wounds of it are far from being matters of indifference. Every chance of life is to be embraced, and a good surgeon will never hesitate to execute whatever appears feasible, or even possibly beneficial; but at the same time he will not act without some such kind of warranty as shall prove that his patient's benefit was his one object, and will take care that neither his prognostic nor his conduct shall expose him justly to the censure of being either ignorant, unfeeling, or fool-hardy.

Upon the removal of a piece of bone by means of the trephine, if the operation shall have been performed over the part where the disease is situated, and the extravasation be of the fluid kind, and between the cranium and dura mater, such fluid, whether it be blood, water, or both, is immediately seen, and is partly discharged by such opening: if, on the other hand, the extravasation be of blood in a coagulated or grumous state, it is either loose, or in some degree adherent to the dura mater: if the former of these be the case, it is either totally or partially discharged at the time of or soon after the operation, according to the quantity or extent of the mischief: if the latter, the perforation discovers, but does not immediately discharge it. In both instances, the conduct of the surgeon, with regard to repetition of the operation, must be

determined by the particular circumstances of each individual case; a large extravasation must necessarily require a more free removal of bone than a small one; not only on account of freedom of discharge, but on account of larger detachment of dura mater; and a grumous or coagulated extravasation requires a still more free use of the instrument, not only because the blood in such state is discharged with difficulty, but because the whole surface of the dura mater so covered is always put under the necessity of suppurating, which suppuration has but one chance of a happy event, and that derivable from the free use of the perforator.

When the extravasation is not between the cranium and dura mater, but either between the meninges, or in the ventricles of the brain, the appearances are not only different from the preceding state of the case, but from each other.

When the extravasated fluid lies between the scull and dura mater, as soon as that extravasation is discharged, or the grumous blood has been wiped off, the dura mater appears flaccid, easily yields to or does not resist the impression of a finger, and (the discharge being made) enjoys that kind of motion, that elevation and depression, which our fathers supposed it to have naturally and always, but which is only the consequence of the circulation through the brain, and the artificial removal of the piece of bone. But when the extravasation is situated between the meninges, or on the surface of the

brain, the appearance is not the same. In this case, there is no discharge upon removing the bone; and the dura mater, instead of being flaccid and readily obeying the motion of the blood, appears full and turgid, has little or no motion, and pressing hard against the edges of the perforation, rises into a kind of spheroidal form in the whole of the perforated bone. If the extravasation be of the limpid kind, the membrane retains its natural colour; but if it be either purely fluid blood, or blood coagulated, and the subject young, the colour of the membrane is so altered by what lies under it, that the nature of the case is always determinable from this circumstance.

Be the extravasated fluid what it may, it has no natural outlet; absorption was the only chance the patient had whereby to get rid of it without an operation, and that we must now suppose to have failed; an artificial opening therefore must be made, by the division of the dura mater, and perhaps of the pia also. This operation, under the circumstances and appearances already mentioned, is absolutely necessary, and has been successful: it is performed to give discharge to what cannot be got rid of by any other means, and consists in a division of the membrane or membranes, made in a crucial form with a point of a lancet. The operation in itself is extremely simple and easy, but the patient is thereby put into the state of one whose meninges have been wounded, with only this difference, that the wound made for this purpose

is smooth and simple, and inflicted with the least possible violence; whereas an accidental wound of the same parts may be lacerated, contused, and attended with circumstances which must aggravate the evil, and may induce worse consequences.

Of commotion or concussion of the solid parts of the brain, we have only a negative kind of proof, and therefore are still more in the dark, than we are with regard to extravasation.

Very alarming symptoms, followed sometimes by the most fatal consequences, are found to attend great violences offered to the head; and upon the strictest examination both of the living and the dead, neither fissure, fracture, nor extravasation of any kind, can be discovered. The same symptoms, and the same event, are met with when the head has received no injury at all *ab externo*, but has only been violently shaken; nay, when only the body or general frame has seemed to have sustained the whole violence. It is a commonly received opinion, that a concussion of the brain is always in proportion to the resistance which the cranium makes; that if the latter sustains a considerable degree of fracture, the former is but slightly injured, and that the concussion is greatest when the scull is least hurt. This may sometimes be the case; violent and even fatal commotions of the brain happen when no injury has been done to the scull, and very large and terrible fractures are sometimes unattended with

any symptoms of concussion; all this is sometimes true, but the position can by no means be admitted as a general principle, whereon to form our judgment, or whereby to regulate our conduct; experience frequently contradicting it.

The symptoms attending a concussion are generally in proportion to the degree of violence which the brain itself has sustained, and which indeed is cognizable only by the symptoms. If the concussion be very great, all sense and power of motion are immediately abolished, and death follows soon: but between this degree and that slight confusion (or stunning, as it is called) which attends most violences done to the head, there are many stages. Sometimes a concussion produces the same kind of oppressive symptoms as an extravasation, and the patient is either almost or totally bereft of sense: at other times no such symptoms attend, but the patient gets no sleep at all, has a wild look, an eye much like to that of a person who has long watched through apprehension and anxiety, talks much and very inconsistently, has a hard labouring pulse, some small degree of fever, and sometimes an inclination to vomit: if not retained, the patient will get out of bed, and act with a kind of frantic absurdity, and appears in general much hurt by a strong light. A debility of understanding, an idiot look, a failure of memory, a paralytic affection of some one part or limb, the loss of sense, spasm, resolution or rigidity of some one part or muscle, are often the consequence of it. These complaints are

sometimes cured, but some of them do sometimes remain through the rest of life.

To distinguish between an extravasation and a commotion by the symptoms only, is frequently a very difficult matter, sometimes an impossible one. The similarity of the effects in some cases, and the very small space of time which may intervene between the going off of the one and accession of the other, render this a very nice exercise of the judgment. The first stunning or deprivation of sense, whether total or partial, may be from either; and no man can tell from which: but when these first symptoms have been removed, or have spontaneously disappeared; if such patient is again oppressed with drowsiness, or stupidity, or total or partial loss of sense, it then becomes most probable that the first complaints were from commotion, and that the latter are from extravasation; and the greater the distance of time between the two, the greater is the probability not only that an extravasation is the cause, but that the extravasation is of the limpid kind, made *gradatim,* and within the brain.

Whoever seriously reflects on the nature of these two causes of evil within the cranium, and considers them as liable to frequent combination in the same subject, and at the same time considers, that in many instances no degree of information can be obtained from the only person capable of giving it (the patient), will immediately be sensible, how very difficult a part a practitioner has to act in many of these cases, and how very unjust it must be to call that ig-

norance, which is only a just diffidence arising from the obscurity of the subject, and the impossibility of attaining materials to form a clear judgment.

When there is no reason to apprehend any other injury, and commotion seems to be the sole disease, plentiful evacuation by phlebotomy and lenient cathartics, a dark room, the most perfect quietude, and a very low regimen, are the only means in our power; and are sometimes successful.

Having in the preceding sheets frequently spoken of the trephine, I have only to add, that if such operation be attended with success, that is, if an extravasated fluid be thereby discharged, a depressed bone elevated, matter which had been formed between the scull and dura mater let out, or the inflammatory tension of the membrane prevented, in such manner as to rescue the patient from the danger he was in from such accident; in such cases, I say, that the bare dura mater readily obeys the motion of the blood through the brain, and is freely elevated and depressed; by degrees it loses its bright silver hue, and becomes purulent and sloughy, and then casting off this slough, is covered by a granulation of new flesh, of firm consistence and florid red colour; moderate quantity of good matter is discharged daily, and the new incarnation rises gradually through the perforation, until it gets above the edges of it, when joining with that which either has sprung from the surface of the bare cranium, or which has

thrown off from thence a small exfoliation, they together make a firm cicatrix. During all this time the patient is generally free from fever or pain, gets good sleep, has a natural appetite, and seems as near to being in health as his circumstances can permit.

On the other hand, if the mischief be such that all means prove ineffectual, the appearances are very different. The dura mater, instead of casting off a thin slough and incarning kindly, becomes hard, tense, and foul; in a few days it generally thrusts up an ill-natured fungus, which, pressing hard against the edges of the perforation, prevents the discharge from within; the bare bone becomes blackish or deeply yellow, and the edges of the sore in the scalp are painful, loose, flabby, and have no connexion with the bone on which they lie; the discharge is a thin stinking gleet, and large in quantity; the patient is hot, thirsty, and sleepless; the tongue is black, the pulse hard and quick; sometimes a delirium, and sometimes frequent spasms disorder and shake his whole frame; his countenance is flushed and has a yellow tint, his eyes lose all their natural brightness and seem sunk in their orbits; and his rigors, which were at first slight and few, become more frequent and more severe as his dissolution approaches. A slight degree of these symptoms is sometimes got the better of by proper care and treatment; but if they are far advanced, or run very high, we may use the words of a very excellent writer on this subject, I mean

Berengarius Carpensis[b]: *Hic casus est de his, e quibus non evadunt aliqui, nisi nutu dei.*

[b] The sentiments of a very ancient writer on this matter are so very just and apposite, that I hope the reader will excuse the length of the quotation.

" Qui sanescere possunt, vel perituri sunt, ex his conjicere " est; plurimum quidem ex ipso vulnere, deinde et ex reliquo " corpore.

" Salubriter se habentium notæ sunt, ulcus non dolens, " cerebrique membrana naturalem colorem, ac motum ser- " vans, et ulcus post suppurationem imminui. Pus album, " æquale, modice crassum, non male olens. Ulcus quod " initio album apparuit, post aliquod tempus rubescere, " carnem milio similem producere, squamulasque suis tem- " poribus emittere; sine perturbatione somnum capere; sine " febre esse; cibum appetere; assumpta digerere; æquas " excretiones fieri; glandulas, quæ primis diebus apparuerant, " aut erysipelas cito dissolvi.

" Eos qui periclitantur cognoscere licet tum aspectu, tum " ex iis quæ vulneri cæteroque corpori accidunt, et iis quæ " excernuntur. Color igitur plerumque languidus et per- " manens, periculosus, oculique concavi et extantes, &c. " Ulcus dolere, magis interdiu, retorridum fieri, atque omni " plerumque tumore carere, vel saniem manare tenuem ac " male olentem; orasque sectæ carnis admodum rubras et " flaccidas esse, atque ubi magis reflexæ sint, tunc abscedere " cutem ab osse molestum est, membranamque vulneratam " immobilem esse, exalbidam vel lividam apparere, vel " nigram, vel plurimum inflammatum aut procidentem, " purgatamque, iterum sponte non ob aliqua re externa " sordescere." ORIBASIUS *De Signis.*

" Spem vero certam faciunt, membrana mobilis ac sui " coloris, caro increscens rubicunda, facilis motus maxillæ, " atque cervicis.

" Mala signa sunt membrana immobilis, nigra vel livida, " vel aliter coloris corrupti, dementia, acris vomitus, ner- " vorum distensio vel resolutio.—Caro livida, maxillarum " atque cervicis rigor." CELSUS.

CASE XXXIII.

A YOUNG fellow about twenty-four years old was thrown by the swing of a crane at the water-side from a window two stories high, and pitched his head on a sugar hogshead. He was taken up senseless, and brought in that state to St. Bartholomew's hospital.

He was immediately let blood freely, and his head being first clean shaved, was very carefully examined, but no external mark of violence was found. Next morning he was bled again, and the same operation was repeated in the evening of that day, and twice in the course of the third. On the fourth day both the temporal arteries were opened, and bled freely. On the fifth day he died, his symptoms not having remitted in the smallest degree. The cranium was perfectly uninjured. The dura mater every-where adherent, and no fluid of any kind between it and the scull. Between the dura and pia mater was a considerable quantity of fluid blood, and principally toward the lower part of the brain.

CASE XXXIV.

A HACKNEY coachman was thrown from his box in Holborn, and fell on his head, as it was thought. He became immediately insensible,

and was brought so to the hospital. No mark of violence was to be found on any part of his head, and therefore, although his symptoms were such as rendered an extravasation most probable, yet there was no reason for setting on the instrument on any particular part. Every thing was done for him, both by the physician and myself, from which any advantage might reasonably be expected; but on the third day he expired, having never showed any signs of sense.

All the space between the frontal bone and the dura mater was covered with grumous blood, firmly adherent to the latter.

CASE XXXV.

A BRICKLAYER'S labourer fell from a high scaffold, broke one arm and one thigh, and was brought to the hospital about two hours afterward in a state of stupidity. When his arm and thigh were put to rights, his head was examined, but no mark of mischief discovered. He was bled freely, and stools procured on each day for four successive days: but he continued in the same state. On the fifth a small tumor arose on the right side of his head. The scalp was removed, and the bone being found bare, it was immediately perforated. The perforation made way for a large discharge of blood which had been contained between the dura mater and scull. On the first and second day from this operation he remained the same; blood was

drawn from some part of him on each, and the discharge continued large and free through the opening made in the bone. On the third day from the application of the trephine, he became toward evening somewhat sensible. On the fourth, having taken a laxative medicine, he had a smart purging, which lasted some hours. On the sixth he was quite calm and sensible, but being reduced to a very low state by his free and frequent evacuations, it was thought right to give him the cortex. This agreed well with him, and from this time he had no other difficulty or trouble.

CASE XXXVI.

A BOY about ten years old, climbing up a ladder which was set too perpendicularly, fell from an height of more than twenty feet; he lay some time before he was found, and then was carried home perfectly void of sense. In about three hours after the accident I saw him. He lay quite stupid and senseless, now and then vomited, had a hard, full, labouring pulse, and an obstructed respiration. No mark of violence appeared on his head. He was bled freely, and had a stimulating clyster, which procured a free discharge. During three days he was let blood twice a day; on the fourth, a small degree of tumefaction appeared on the right side of his head near to the sagittal suture; it was not very manifest, neither did it appear to contain any considerable quantity of fluid, but the very

desperate circumstances the child was in, induced me to open it, and, finding the scull bare, to perforate. The dura mater was covered with blood, which discharged freely both at the time of the operation, and during all the next day. On the third day from the operation, he was still insensible. A second perforation was made just below the first, and a third on the other side of the suture. Blood was discharged freely from all three. He was dressed lightly, and his pulse being still strong, more blood was drawn from one of the jugulars. The next day he was rather better, but far from sensible. The day following that, he recovered his understanding, and could make signs for what he wanted. It was near a week more before he got his speech, but in the end he got perfectly well.

CASE XXXVII.

A BOY between three and four years old, the son of a merchant in my neighbourhood, was at play with his brother on a bed, and fell from thence on a soft bedside carpet. He pitched on his head, and complained immediately of being sick and giddy, but having vomited, was soon after so well that no farther notice was taken of his fall. On the fourth day from this, his sickness and giddiness returned. Dr. Lee was sent for, who not regarding the fall as having any share in his complaint, gave him an emetic, and ordered him some of those medicines which

are called nervous. For the space of five days from this time, he continued to be now and then sick and giddy, and was very unwilling to stir or be stirred. On the eleventh he complained that he could not see, and that evening had a sort of fit. On the thirteenth his right arm became useless. On the fifteenth he could not stand. From this evening he became stupid; and on the eighteenth expired.

Between the dura and pia mater was a considerable quantity of bloody serum about the basis of the brain.

CASE XXXVIII.

A WOMAN came to my house, complaining that her husband had kicked her down stairs, and had broke her scull. On the back part of her head was a small wound, but the pericranium was not divided, nor was there any reason to suppose the bone to be hurt. For twelve days she remained without any general complaint; but on the thirteenth she began to be giddy and dim-sighted.

I took her into the hospital, where she was taken all possible care of; but she became first paralytic, and then comatose, and so died. The ventricles of the brain were full of extravasated serum, and near the origin of the medulla oblongata was a large lump of firmly coagulated blood.

CASE XXXIX.

A CARPENTER'S labourer in Blackfriars fell from a scaffold of a considerable height, and in his way down struck a piece of timber, which, following him, hit him on the head. The man fell on his breech. He was brought to the hospital senseless. The mark on his head made by the timber was scarcely visible, and did not imply any mischief underneath. He was freely let blood, and his body emptied by a clyster administered that day. The next day more blood was drawn from one jugular; and the third the same operation repeated. On the fourth he spake, and on the fifth was so sensible as to give an account of the place from whence he fell. On the sixth, seventh, eighth, ninth, tenth, and eleventh, he was free from complaint, except on the two last he was too much inclined to dose. On the twelfth he found some difficulty in pronunciation, and said, that it was with great difficulty that he could keep himself awake. As his pulse would very well bear it, more blood was drawn away by opening the temporal artery, and a blister was applied to his neck. On the fifteenth he could hardly speak at all, and was never awake unless disturbed for that purpose. On the eighteenth he lost the use of his left side, and on the twentieth died.

About the lower part of the brain was found a small quantity of bloody serum, and all the ventricles were filled with a clear lymph.

CASE XL.

A BOY about fifteen was thrown over the head of a horse, who fell down with him in Smithfield. There was on the side of his head a large wound, with a bare parietal bone; and although there was no appearance of fracture, yet the violence having been great, and the boy being perfectly stupid, I immediately perforated the bare bone, suspecting an extravasation on the dura mater. That membrane was perfectly fair and adherent, nor was there any appearance of extravasation either upon or under it. The next day he was still insensible. I examined the membrane again very carefully, in order to see whether there was any sufficient reason for dividing it, but could find none. Blood was drawn from different parts in large quantity, but to no purpose; he lived three days as it were in a deep sleep, and then died. There was no injury done to the scull; no extravasation of either blood or serum, either upon or between the membranes, nor any unnatural appearances in the cavities of the brain: but upon the plexus choroides was a lump of coagulated blood, near as big as half a small chesnut.

In the course of these papers I have more than

once said, that although the symptoms arising from pressure made on the brain and nerves, or on the meninges, were uniform and clear, and perfectly distinct from those caused by inflammation, yet that they very seldom indicate what kind of body such pressure was made by; whether blood, water, or bone; and consequently, that though the disorders proceeding from pressure were perfectly distinguishable from those caused by inflammation, yet they were not at all or very seldom so with regard to each other. Some of the immediately preceding cases are proofs with regard to blood and lymph, and what follow will I think in some degree prove that the symptoms are the same when they are caused by bone, or by blood and bone together.

CASE XLI.

A CHILD about nine years old received a blow from a cricket-bat on the upper part of his forehead, which brought him to the ground, and deprived him of sense. I found him with a considerable tumor on his forehead, and considering the state he was in, would have removed immediately a part of the scalp; but a dabbler in surgery, who was a relation, undertook to cure him by an application. On the third day I was sent for again, and found him nearly in the same state as I left him. I divided the scalp, and found a fracture with depression. By means of the trephine and elevator, the de-

pressed part was raised, and the dura mater being found in a very good state, and no apparent extravasation in the case, nothing more was done at that time. Proper medicines were ordered to procure stools. The next day his symptoms were the same, except that his pulse was less labouring, and he had not the apoplectic stertor, which he had till then. I examined the bone, which lay perfectly smooth, nor was the dura mater at all elevated into the perforation. Blood was freely drawn from the temporal arteries, and a stimulating clyster administered. On the fifth day no alteration. I applied a trephine in the middle of that part of the bone which had been depressed and elevated[c]. The dura mater was thinly covered with grumous blood, which being gently wiped away, more of the same appeared; for two or three days this discharge continued in small quantity; the boy gradually recovered his senses, and in due time got well.

CASE XLII.

A YOUNG woman was thrown out from a country waggon, upon a broad flat pavement, and was said to have pitched upon her head. She was instantly deprived of sense, and brought

[c] As this portion of bone must have been moveable, or unfirm, the operation must have been difficult. Without doubt, so experienced an operator as Mr. Pott took care to have the portion of bone properly supported by an assistant, with an elevator. E.

to the hospital in that state. Her head was immediately shaved and examined, but found to be so absolutely free from all mark of violence, that I was in doubt of the truth of the account given of her. She was freely let blood, and some medicines directed to be got down, in order to empty her. The next day she was in the same state. More blood was drawn off, and her cathartic repeated. The third day, she being exactly the same, both the temporal arteries were opened. On the fourth, there being no alteration, I determined to apply a trephine on that part of her head, on which she was said to have fallen, and which when pressed hard seemed to produce such motion in her as if it gave some pain. In a case of less necessity this would hardly have been sufficient reason: but here something was to be attempted. I removed a large piece of scalp, and found the pericranium, though not detached absolutely, yet not naturally or firmly adherent. I applied the trephine, and when I had worked a few seconds, I took out the instrument to clean it, but was much surprised to find in it a piece of the upper table of the scull. I put in my finger to feel what was underneath, and found that it touched the remaining table, which receded from the finger, and returned again upon removing it; and when I pressed the said loose piece hard, the girl's whole frame was spasmodically agitated. What was to be done? It appeared to me, that if all her symptoms were not caused by the pressure of the loose piece,

yet they were certainly aggravated by it, that it must therefore be taken away at all events, and that it was much too large to be extracted at the present opening: beside which, as it ran upward toward the sinus, I should not have chosen to run the risk of an hæmorrhage from thence while the sinus was covered with bone. I perforated all round the present opening with a small trephine, in such manner, that each perforation so bordered on the other as that the whole should make one opening.

For near one half the circle the outer table only came away in the instrument, leaving the inner loose and covered with blood, but in all the lower part the trephine went through both tables, and left the dura mater covered with grumous blood also. When the circle was finished, the loose portion was easily taken away; its upper part made a part of the sagittal suture, but no blood followed its separation. The dura mater under the whole was thinly covered with grumous blood. Next day she retained her urine, and opened her eyes. In two more she recovered her speech, and became as rational as I suppose she ever had been; and would in all probability have done well, as far as regarded the evils produced by mere pressure; but after some days matter formed between the detached dura mater and the scull, and the symptomatic fever usually accompanying such mischief came on with such rapidity, that all the efforts of art were vain.

CASE XLIII.

A PORTER at work at the water side, was knocked down by a blow from an iron hook, at the end of the tackle belonging to a crane. He was senseless for near half an hour, but after that was so well as to walk home. The next morning he lost his sight, and by the evening his speech and faculty of walking. In this state he was brought to the hospital. He was largely let blood, and thoroughly emptied; and I intended, if these evacuations did not materially serve him, to have examined the state of that part of the bone whereon the blow was received; but that night he died.

Upon examining his head, a piece of the inner table of the right os parietale, of about an inch and half in length, and not quite so broad, was found detached from the outer table, having a quantity of blood both between them and on the surface of the dura mater.

These are the only instances which I have met with of fracture of the internal table alone; though I make no doubt, that some of those who have been said and thought to have been destroyed by concussion, have sunk under this kind of mischief.

OBSERVATIONS

ON THAT

DISORDER

OF THE

CORNER OF THE EYE,

COMMONLY CALLED

FISTULA LACHRYMALIS.

THE

PREFACE.

By frequently conversing with some of that part of the profession who come to *London* to attend the hospitals, and to improve themselves in the art of surgery, it has appeared to me that the FISTULA LACHRYMALIS, though a very common disease, is one with which many of them are very little acquainted, either with regard to its cause, seat, or method of cure. Some are totally ignorant of every thing relating to it: others, who have an imperfect idea of its nature and seat, are yet much at a loss how to vary the method of treating it, according to its different states and circumstances; upon which distinction the probability of a cure does often in great measure depend; for if those means which are only proper in one state of the disease be used in another, the patient will be fatigued to no purpose, and the surgeon by being frequently disappointed will be inclined to think those cases incurable, which have only failed through his own mismanagement.

There is hardly any chirurgical disorder which requires a more close regard to all its appearances and variations than this does; and whoever expects to conduct it successfully, must attend to it constantly. This is, perhaps, the great reason why it is so little understood; the object is too minute, and the process often too long, to engage the attention; besides which, it hardly comes under the name of an operation, the great and almost only object which they who come hither from the distant countries have in view: the operative part of surgery is what they have seen the least of, and therefore they are the more desirous of becoming acquainted with it: this desire is a very laudable one, and ought certainly to be encouraged, but still the operative part of surgery is far from being the whole of it; and I cannot help thinking, that by attending a little more to what is called common or practical surgery, our art might still be considerably improved, practitioners rendered more expert, and mankind much benefited.

The merely curing diseases is not all: that was done (sooner or later) while surgery and anatomy were in their most imperfect state, and while every branch of medicine laboured under many inconveniences which are now happily removed; but the different methods in which chirurgical disorders are treated, or their cures attempted, will make so considerable a difference in the confinement and sufferings of the patient, as to be very well worth attending to.

It may possibly be thought foreign to my present purpose, but I cannot omit this opportunity of adding a few words on a subject which appears to me highly deserving of some notice, as its influence may be very extensive and very prejudicial; it is the false idea which the by-standers at an operation generally have of chirurgic *dexterity;* to which word they annex no other idea than that of quickness. This has produced a most absurd custom of measuring the motion of a surgeon's hand, as jockeys do that of the feet of a horse, viz. by a stop-watch; a practice which, though it may perhaps have been encouraged by operators themselves, must have been productive of most mischievous consequences. *Tute et celeriter* are both very proper characteristics of a good chirurgic operation; but *tute* stands, as it should do, in the first place; as the patient who suffers the smallest injury from the hurry of his operator, has no recompence from the reputation which the latter obtains from the by-standers. In most of the capital operations, unforeseen circumstances will sometimes occur, and must be attended to; and he who, without giving unnecessary pain from delay, finishes what he has to do in the most perfect manner, and the most likely to conduce to his patient's safety, is the best operator.

I have endeavoured to make the following tract as plain and as intelligible as I can; and, if it should appear prolix to those who are already acquainted with the subject, I must beg leave to observe, that

it was not written for their information; but if any of those who were unacquainted with it before should from hence gain any useful knowledge, my end will be answered, and I shall be much gratified.

OF THE

FISTULA LACHRYMALIS.

SECT. I.

THE ancient writers were in general so little acquainted with the anatomical structure of the parts concerned in this disease, that both its cause and seat have been very erroneously represented by most of them; other disorders, very different both from this and from each other, have been confounded under the same general appellation; and the means made use of toward obtaining a cure, being adapted to such misconceptions, were rough, painful, and most commonly ineffectual.

The fluid which perpetually moistens the eye, was supposed to be secreted by that small eminence in the inner angle, now called the caruncule, and to flow from thence upward through the puncta lachrymalia[a]. The carun-

[a] Fallopius, who has very accurately described the puncta lachrymalia, sacculus, and duct, as well as the disease, has yet fallen into this common error. "Ad occulos ipsos ex "faucibus egrediens venio, in quibus primum pætermisere "anatomici duo foramina parva in angulo interna posita, "quarum, unum est in palpebra superiori, alterum in "inferiori, in viventibus adhuc hominibus, si quis inspicere

cule was by many thought to be the seat of the disease in question, which was said to be produced, either by a defluxion from the brain[b] on this part, or by an abscess formed within the body of it; or by a lodgment of the tears, become acrid and corrosive in consequence of such stagnation[c]; while others looked upon

" voluerit apparentia, quæ foramina habent meatus qui sub " caruncula encanthidos vel epicanthidos dicta uniuntur in " quendam communem sinum in narium cavitatem desinentem " per canalem proprium in osse squamoso, quod internum " angulum occupat insculptum.

" Per hos meatus major lachrymarum pars ut ego in fletibus " mulierum observavi, ad oculos emanat." FALLOPIUS.

" Non enim os solummodo cariosum, verum etiam glandula " ita erosa erat, ut quotiescunque puer ploraret, lachrymæ " per ipsam fistulam copiosè extillarent." HILDANUS.

[b] " Fistula lachrymalis sit ex humorum decursu, qui " currant ad lachrymalis angulum juxta nasum, nec propter " eorum multitudinem, et grossitatem possunt exire, &c. " hi autem morantes ibi diutius corrumpuntur, et locum " ulcerant." LANFRANC.

" Ægylops est tumor abscessorius inter majorem angulum, " et nares proveniens." PAULUS.

[c] " At the great corner of the eye there is a glandule made " for receiving and containing the moisture which serves for " lubricating the eye; this glandule sometimes, by a sanguine " or pituitous defluxion falling violently from the brain, swells " and impostumates, and ulcerates," &c. AMB. PAREY.

" Hæc caruncula ab acrium humorum affluxu turget, non- " nunquam intumescit, et abscedit ulceraturque, ulcere non " raro in fistulam abeunte, adeo ut subjectum os corrumpatur." MUNNICKS.

" Per pusillum utriusque palpebræ foramen lachrymæ " naturaliter effluunt." FAB. ab AQUAPENDENTE.

" Lachrymæ veniunt per lachrymalia a foramine quodam " parvo, et quasi insensibili in fine pilorum." GUIDO.

it as a kind of encysted tumor. The swelling in the inner corner of the eye, the frequently-attendant ophthalmy, the involuntary flux of serum down the cheek, the excoriation of the eye-lid, and the discoloured discharge upon pressure, strengthened their opinions, and confirmed their prejudices.

They who supposed it to be caused originally by a defluxion of the inflammatory kind, tending to produce an abscess, had recourse at first to those general methods and means which were thought most likely to prevent such consequence: these not answering, they proceeded to open the supposed abscess, and to endeavour the digestion of it: on the other hand, they who supposed it to be an encysted tumor attempted the eradication of it either by knife, caustic, or cautery; and all of them taking it for granted, when the discharge was apparently purulent, or much discoloured, that the bone was rotten, advise the use of escharotic applications, or the hot iron, to destroy the callosity, and to dry and exfoliate the caries; and these methods failing, as in the nature of things they very frequently must, they pronounced the disease to be incurable.

A more minute and careful examination into the anatomy of the parts has given us a more true idea of the disorder, and furnished us with a more rational, as well as a more successful, method of treating it. We now know that the caruncule is not the organ which secretes the tears, but that this office is performed by a

gland, situated near the outer corner of the eye; that the lachrymal fluid is in its nature perfectly innoxious; that an obstruction in the nasal duct is most frequently the primary and original cause of the complaint; and that its seat is in the sacculus lachrymalis.

Upon these principles the modern practitioners have, with great industry and ingenuity, endeavoured to find out some means whereby this obstruction may be removed, and the parts restored to their natural and healthy state, without such pain, destruction, and deformity, as the ancient methods occasioned; or, these failing, to establish a new artificial passage, which may in some measure supply the place of the natural one.

All these means have the merit of being founded on the natural structure of the parts concerned. When the more easy and mild ones succeed, the patient gains a considerable advantage; and when they do not, little time is lost, nor is any more efficacious method rendered thereby less practicable: in this, as in every other part of surgery, the more simple means ought to be first tried; pain should be avoided as much as possible, except when absolutely necessary, and then it must be submitted to.

SECT. II.

THAT the motions of the eye-lids may be performed with the utmost ease, that the tunica cornea may be kept constantly clean, bright, and fit for the transmission of the rays of light, and that dust, and other hurtful particles, may be immediately washed away, the surface of the eye is continually moistened by a fine limpid fluid.

This fluid is derived principally from a large gland, situated under the upper edge of the orbit, near the outer corner of the eye, which gland is of the conglomerate kind, and lies in a small depression of the os frontis; its excretory ducts, or those by which it discharges the secreted fluid, piercing the tunica conjunctiva, just above the cartilaginous borders of the upper eye-lids.

While the caruncule was thought to be the secretory organ of the tears, this gland bore the title of glandula innominata; but now that its use and office are known, it is called glandula lachrymalis.

By irritation from any sharp or poignant particles, a large quantity of this fluid is immediately secreted, and by the motion of the eye-lids is as immediately derived over the surface of the eye, by which means such particles are washed and wiped off. Sometimes also the passions of the mind produce an immediate increase of this

lymph, which is then strictly and properly called tears; a constant secretion of too large a quantity causes a disease, called epiphora; and a deficiency of it makes the motions of the lid difficult and painful.

Although the fluid secreted by the lachrymal gland is considerable in quantity, yet when it is not suddenly produced by irritation from without, or passion within, it is so constantly and gradually carried off, as to create neither trouble, uneasiness, nor blemish.

The edge, or border of each eye-lid, is formed by a thin cartilage, the figure and consistence of which keep the lids properly expanded; these cartilages are covered by a fine membrane, and are called cilia; their internal edges do, upon every motion, sweep over every point of the surface of the cornea; this motion, though almost imperceptible, unless attended to, is very frequently performed; and as the secretion of the fluid is also constant, the eye is by this means kept always moist, clean, and bright.

At the extremity of each of these cartilaginous borders of the eye-lids, on the side next the nose, is the small papilla, or eminence; and in the middle of each of these is a small hole, or perforation, which being made in the cartilage is not liable to collapse while the parts are in a sound state, but remains always open: they are called the puncta lachrymalia, and their office is to receive the lachrymal fluid, as it runs off the corner along the edges of the eye-lids, thereby preventing it from trickling down the cheek;

and that there may be no impediment to the constant execution of this office, during the time of sleep, as well as that of being awake, the internal edges of the cilia do not come into immediate contact with each other in that point where these orifices are.

From each of these puncta lachrymalia proceeds a small membranous tube, which tubes soon enter into, or form a pouch or bag, situated near the inner angle of the eye, just below the union of the two lids, under the musculus orbicularis palpebrarum; the bag is called the sacculus lachrymalis, and its office is to receive all the lymph brought by the puncta and ducts: the upper part of this sacculus lies in an excavation, formed partly by the nasal process of the os maxillare superius, and partly by the os unguis; the lower part of it is confined in a long channel, and forms a tube, or duct, which descending obliquely backward communicates with the cavity of the nose, behind the os spongiosum superius, by an opening whose size is somewhat different in different subjects.

This passage is called the ductus ad nares or the ductus nasalis, and through it whatever is received by the sacculus from the puncta, does, in a healthy and sound state of these parts, pass into the nose.

The membrane which lines this sacculus and duct, is in its structure much like to the membrana pituitaria narium, from the surface of which a clear viscid mucus is secreted, and by

which the sacculus and passages are constantly moistened and kept pervious.

While the parts are in a healthy sound state, the fluid secreted by the lachrymal gland passes off through the puncta, sacculus, and duct, into the nose, without any trouble; but when they are in a diseased state the case is otherwise. This membrane, like all other vascular parts, is liable to inflammation, by which means it often happens that it is so thickened as to obstruct the nasal duct, and thereby much impede, or totally hinder, the passage of any thing through it; in consequence of which obstruction the sacculus is filled by its natural mucus, and the derivation of the serum from the lachrymal gland through it being thus prevented, it runs off from the eye-lid down the cheek: this obstruction continuing, and the mucus still lodging, the sacculus is dilated, and produces that tumor in the inner corner of the eye, and that discharge, upon pressure, which characterise the first state of the disease in question, and, in conjunction with several other attending symptoms, prove its seat to be in the lachrymal sac, and nasal duct.

SECT III.

ALTHOUGH the seat of this disease is the same in almost every subject, yet its appearance is very different in different persons, and

under different circumstances. These variations depend principally on

1. The degree of obstruction in the nasal duct.
2. The state of the cellular membrane covering the sac.
3. The state of the sacculus itself.
4. That of the bone underneath.
5. The general state and habit of the patient[b].

Sometimes a serous kind of defluxion, by which the lining of the sac and duct are so thickened as to obstruct, or prevent, the passage of the fluid through them into the nose, makes the whole complaint; and the cellular membrane on the outside not being diseased, there is no appearance of inflammation. In this case the duct is stopped, and the sacculus dilated, but without any alteration in the colour of the skin; a fulness appears in the corner of the eye next to the nose; and upon the application of a finger to this tumor, a clear viscid mucus is discharged through the puncta lachrymalia: the patient feels no pain, nor finds any inconvenience, except what is produced by the discharge of this mucus, and by the trickling of the lymph down the cheek.

[b] As the state and circumstances of this disease are really various, and differ very essentially from each other, the general custom of calling them all by the one name of fistula lachrymalis is absurd.

In some cases the mucus is not perfectly and always clear, but it is sometimes cloudy, and looks as if it had a mixture of milk or cream in it: at first waking, some of it is generally found in the corner of the eye; and the eye-lashes, being smeared over with it during sleep, most commonly adhere together in the morning.

This is the most simple state of the disease, what the French have called the hernia, or hydrops sacculi lachrymalis: it is frequently met with in children who have been rickety, or are subject to glandular obstructions; and in this state it sometimes remains for some years, subject to little alterations, as the health or habit shall happen to vary, the sacculus being sometimes more, sometimes less full, and troublesome; the mucus which is pressed out is sometimes more, sometimes less cloudy, and now and then it is attended with a slight ophthalmy, or an inflammation of the eye-lids, but which, by common care, is easily removed.

When the sacculus is not much dilated, the discharge small, and produced only by pressure, the chief inconveniences are the weeping eye, and the gumming together of the lids, after sleeping: but these, by being attended to, may be kept from being very troublesome; and if the disease makes no farther progress, may be so regulated as to render any more painful process totally unnecessary.

When the dilatation is considerable, the swelling is more visible, and the quantity of mucus is larger: it is also in this state more frequently

mixt and cloudy, and more troublesome, from the more frequent necessity of emptying the bag. But if the patient be adult, it may, even in this more dilated state of it, be kept from being very inconvenient.

If an inflammation comes on, the tumor is thereby considerably increased, the discharge is larger, as well during sleep as upon pressure; the skin covering it loses its natural whiteness and softness, becomes hard, and acquires an inflamed redness; and with the mucus a mixture of something, which in colour resembles matter, is discharged, especially if the pressure be made with any force, or continued for any time: this circumstance, added to the painful sensation, and inflamed appearance of the parts, has been productive of a supposition, that in this there is either an ulcer or an abscess within the sacculus or duct.

As this is an opinion which, though it may possibly sometimes have some foundation in truth, yet it is in general entertained much too hastily, and is also the principal source whence most of the mistakes concerning this disease have sprung, I would beg leave to be indulged a few words on this subject.

It has already been observed, that from the surface of the membrane which lines these parts a thin mucus is secreted, by which its surface is smeared over, in the same manner as is that of all the membrane which covers or lines the fauces, larynx, and internal parts of the nose, the antra of the jaws, and the sinuses of

the sphenoid and ethmoid bones, &c. While the lachrymal sac is free from disease, and the ductus ad nares open, this mucus is nearly limpid in colour, small in quantity, and passes insensibly into the nose with the fluid from the lachrymal gland; but when, by the obstruction of the nasal duct, that passage is denied, it necessarily lodges in the sacculus; by distending and irritating its containing bag it is increased in quantity, altered in colour, and discharged at the puncta lachrymalia, as it either becomes too much for the sac to contain, or as it is forced out by pressure. This is a short and succinct account of the true nature of the disease, and such as will fairly and truly account for all its symptoms and appearances, without any recourse to either abscess or ulcer, circumstances which very seldom, if ever, attend it.

That which is mixed with the clearer part of the mucus, and which from its pale yellow hue is taken for matter, is not matter, but mucus, which in this part, as well as several others in the body, does, either by being confined beyond the necessary time, or by inflammation, or irritation of the gland or membrane which secretes or contains it, or even from general affection of the habit, put on a yellow purulent colour, where there is neither abscess nor ulcer in the part whence it comes.

So many instances of this are producible as to put the matter beyond all doubt; the urethra, vagina, and all the sinuses of the head which communicate with the nose, furnish us with

them daily; the linings of all these are constantly imbued with a mucus naturally clear, and no more in quantity than is necessary to keep the membranes moist; but either inflammation or irritation does immediately so add to its quantity, and so alter its colour, that in the two former the same mistake has often been made as in the subject in question; that is, the discharge has been thought to be purulent, and produced by ulceration of the parts.

These two fluids, pus and mucus, which have been so frequently confounded together, do really differ so widely from each other in their nature, constitution, sources, purposes, and effects, that to distinguish them properly, and to point out the true character of each, seems to be a matter of much importance: it would carry me too wide from my present purpose to attempt it in this place, and therefore I shall only just mention what may serve merely to illustrate that.

If I conceive rightly of this affair, mucus, considered in a general sense, is the effect of a natural secretion made by glands, membranes, or other bodies appointed for that purpose, and is so far from being originally the consequence of disease, that, in a due quantity, it is absolutely necessary for several very important purposes in the animal economy; which purposes, when this fluid is deficient, must be ill executed, and some kind of disease or defect follow: whoever will reflect upon the uses of it in the intestines, joints, sheaths, or capsulæ

of the tendons, in the sinuses of the scull serving the purposes of speech, in the cavity of the nose, where the olfactory nerves do their duty, in the prostrate gland, larynx, trachea, urethra, and vagina, will be easily convinced of the truth of this assertion, both with regard to its natural uses in a healthy state and proper quantity, and the share it frequently has in the production of diseases, when it is either vitiated or redundant.

Pus, or matter, is certainly no natural secretion; suppuration, though it be an act of nature when some parts of the body have been forcibly divided from each other, is nevertheless to be regarded as the effect of violence and destruction, at least of division; for, without entering minutely into the origin or nature of it, I believe I may venture to affirm, that the dissolution of some of the solid particles of broken capillary vessels, and a mixture of some part of the juices which should circulate through them, make a necessary part of its production. However constant its appearance may be in the progress toward healing a wound or sore, yet it never is produced, even in the smallest quantity, without some degree of erosion, some breach in the natural structure of the parts; and when such breach is healed, the discharge necessarily ceases.

On the contrary, mucus may by irritation, relaxation, or defluxion, on its secreting or containing parts or organs, be increased to a quantity far beyond what is necessary or useful,

and produce thereby a disease in parts where there is not the least degree of solution of continuity, as in the cases of tenesmus, stone in the bladder, fluor albus, and simple gleets from the urethra; as also in that kind of defluxion on the nose and fauces, producing a catarrh, and in the immediate effect of all sternutatories.

Other differences between the nature and properties of the two fluids might be mentioned; but if these already cited are just, they will be sufficient to evince the impropriety of confounding them together, either with regard to theory or practice.

Nor is this mistake of discoloured mucus for matter confined to the lachrymal sac only; the two circumstances of pain, and yellow colour, having in almost all times produced the same misconception in the virulent gonorrhea of both sexes: this has been called pus, and being said to proceed from ulcerations in the urethra and vagina, though the repeated testimony of those who have, immediately after death, examined the parts of persons so diseased, has often been produced to the contrary, and though the discharge itself when properly examined will always prove the contrary, inflammation and irritation of the membranous linings of the urethra and vagina will fully account for all the appearances in this disease, in which there is neither matter, nor ulcer, nor abscess: whoever will attend to the discharge made from a purulent ulcer, will find it widely different

from that which issues from either of the above parts in the gonorrhea.

Again, in case of strictures in the male urethra, the discharge occasioned by a bougie, properly and judiciously used, is a discoloured mucus, and not matter, though it is generally so called: it is from the discharge of this mucus, and the dilatation of the passage, that the relief is obtained, not from any destruction or division of parts: the bougie which produces true matter, does much more harm than good, and makes a sore where there was none, and where there ought to be none. How often do catarrhous defluxions on the trachea and larynx wear toward the close a deep purulent colour, so as to deceive the unknowing into an opinion, that it is matter upon the lungs? But no judge of these things ever had recourse to abscesses or ulcers for a solution of such appearance. The argument drawn from the quantity of these discharges is as erroneous as those taken from its colour; as an inflammatory defluxion on the part does generally occasion the latter, so mere irritation will produce the former, which does also generally cease when the irritating cause is removed or appeased. How immediately is a most troublesome tenesmus cured by a clyster of starch and opium? What large fœtid discharges are made from behind the prepuce of many persons, not only free from all venereal taint, but without any ulceration of the parts, by a kind of exsudation? To what length of time will they not continue, if neglected, and

and how immediately do they cease by the use of a spirituous or vitriolic wash? How often is the fluor albus, even in some of its worst circumstances, moderated, not to say cured, merely by washing away the acrid mucus, which, lodging in the rugæ of the vagina, continually irritated the parts to a fresh discharge, and perpetuated the disease? What quantity of slime is there in the urine of those who have a stone in the bladder? And how totally does it cease, upon that stone being discharged, or taken away? Whereas neither cleansing of parts, nor removal of irritating bodies, does, or ever can procure, an immediate cessation of a discharge of true matter, which being occasioned by a solution of continuity, an erosion or division of the parts whence it proceeds must decrease gradually, and at last can only cease by such part becoming whole again.

In short, the two fluids are so absolutely different and distinct, that the blending them together in our ideas of disease, proceeding from, or producing either of them, cannot be too industriously avoided. It is a subject on which a great deal more might be said, as it would comprehend, or have relation to many disorders which perhaps are not sufficiently understood, or attended to; but being beside my present purpose, I shall say no more about it, only desire that I may not be misunderstood as if I meant to assert, that there never is abscess or ulcer in the lachrymal sac and duct: No, I only mean

to signify, that it is my opinion, that the yellow or purulent colour of the discharge, which is generally received as a proof of such, is no proof at all; that this colour may be, and most frequently is, dependent on other causes; that though by the suppuration of the cellular membrane covering the sac, the upper part of it sometimes becomes sloughy, and bursts; yet the lower part of it, and the nasal duct, are often at the same time perfectly sound; and that there never is abscess or ulcer within, while the skin is entire, and preserves its natural hue and softness, let the colour of the discharge be ever so yellow; circumstances of no small consequence in the treatment of this disease.

The inflammation of the cellular membrane covering the sac, is a circumstance which makes a considerable difference, both in the appearance of the disease, and in its requisite treatment: in some cases it is confined merely to the surface of the tumor in the corner of the eye; in others, it spreads still farther, affecting the eye-lids, cheek, and side of the nose.

When the parts are in this state, the mucus within the bag has generally the appearance of being matter, that is, it wears a deep yellow colour, and is of a more thin consistence. If the puncta lachrymalia are naturally large and open, and the inflammation confined to the surface of the sac, its contents will pass off pretty freely, and the skin will remain entire: this is what the ancients called the simple, or imperfect, or anchylops.

But when the skin covering the lachrymal bag has been for some time inflamed, or subject to frequently returning inflammations, it most commonly happens, that the puncta lachrymalia are affected by it, and the fluid not having an opportunity of passing off through them, distends the inflamed skin, so that at last it becomes sloughy, and bursts externally. This is that state of the disease which is called perfect Aigylops, or Ægylops; the discharge which used to be made through the puncta lachrymalia, while the skin was entire, is now made through the new opening, and by excoriating the eye-lids and cheek increases the inflammation, and gives the disease a much more disagreeable appearance. In some the matter bursts through a small hole, and after it has discharged itself, the tumor subsides, the neighbouring parts become cool, and though the skin covering the surface of the sacculus is sloughy and foul, yet there is no reason to believe that the sac itself is much diseased below; in others the breach is large, the skin remains hard and inflamed, and from the appearance of the sore, there is reason to suppose the whole inside of the bag to be in a diseased state; and in some cases, which have been much neglected or irritated by ill-treatment, the cavity of the sacculus seems to be filled with a loose ill-natured fungus, which gleets largely, and produces inflammation and excoriation of all the parts about.

There is also another circumstance which

sometimes is found to attend this disorder, viz. a carious state of the bones. This was by our forefathers supposed to be a frequent one, and was the principal reason for their so free use of caustic, cautery, and scalpra, in the treatment of it; but since the disease has been more minutely examined into, this circumstance has been found to be a very rare one. When the fistula lachrymalis is a symptom of the lues venerea, as it sometimes is, the bones are indeed often carious; but then, the fistula is not the original complaint, but produced secondarily, and is a consequence of the diseased state of the os ethmoides, and ossa spongiosa, of the nose, and is not curable by any local means or applications, but depends entirely on the cure of the disease of which it is a symptom.

I have also seen an abscess after the small-pox, which, by falling on the lachrymal bag, has made it all slough away, and leave the bones bare; which circumstance I have also seen attend the free use of strong escharotics applied to destroy what is called the cyst; but without the accession of some other disorder producing it, or the most absurd method of treating the complaint, I believe that a caries of the bones will very seldom be met with. Indeed the combination of other diseases, either of the general habit, or affecting the same, or the neighbouring parts, does often make a very material difference, both in the appearance of the disorder, in the prognostic, and in the proper method of treating it, which therefore should always be inquired

into: for instance, the patient is sometimes subject to an habitual ophthalmy, or lippitudo, which will add to the deformity, and give a good deal of additional trouble during the cure; an ozæna, or some other disease of the membrane, and cells of the ethmoid bone, or a polypose excrescence within the nose, are now and then combined with it: the habit is sometimes, as I have before observed, infected with the lues venerea, of which this disease may be a symptom; strumous glandular obstructions are its too frequent companions; and, what is worst of all, it is sometimes cancerous.

SECT. I.

FROM what has been said, I think it will appear that this disease, in its primary and most simple state, consists in a detention or lodgment of mucus in the sacculus lachrymalis, in consequence of an obstruction of the natural passage from that bag into the nose; that by means of this lodgment the sacculus is distended, irritated, and sometimes inflamed; that the fluid which passes from the lachrymal gland over the eye to the puncta lachrymalia, being prevented by the fulness of the sac from getting into it, runs down the cheek; and therefore that the characteristic marks of the disorder, when recent, are a small tumor in the corner of the eye, an involuntary flux of serum down that

side of the face, and a discharge of mucus through the puncta lachrymalia upon pressure.

This lodgment, being originally produced by the stoppage of the natural duct, it follows, that the first curative intention is, the removal of that obstruction; which is sometimes practicable, but more often not; the degree of obstruction, its date, the state of the adjacent parts, and some other circumstances, rendering it more or less so in different subjects.

That the inexperienced practitioner may be guarded against giving a hasty prognostic, or making attempts, which, however fatiguing to the patient, must in the end prove fruitless; and that he may be enabled to understand the disease more perfectly, I shall take the liberty to divide it into four general heads, or states, under which all its lesser distinctions may be comprehended.

The first consists in a simple dilatation of the sacculus, and obstruction of the nasal duct, discharging upon pressure a mucus either quite clear or a little cloudy; the skin covering the bag being entire and perfectly free from inflammation.

In the second, the tumor is somewhat larger; the skin which covers it is in an inflamed state, but entire; and the discharge made through the puncta lachrymalia is of a pale yellow, or purulent colour.

In the third, the skin covering the sacculus is become sloughy and burst, by which means the swelling is in some measure lessened; but

the mucus, which while the skin was entire used to be pressed out through the puncta lachrymalia, now discharges itself through the new aperture; the ductus ad nares, both in this and the preceding state, are not otherwise diseased, than by the thickening of its lining.

In the fourth, the passage from the sacculus lachrymalis into the nose is totally obliterated, the inside of the former being either ulcerated, or filled up with a fungus, and attended sometimes with a caries of the bone underneath.

These will, I think, comprehend every state and circumstance of the disease, and, if attended to, will in general point out the proper method of treating it.

The ancients, who supposed this disorder in its first state to be an inflammatory defluxion from the brain on the caruncle tending to suppurate, directed their first attention to prevent such consequence; for which purpose they employed phlebotomy, cathartics, issues, setons, collyria, and refrigerant applications of all sorts[c]; and these not succeeding, they had

[c] The old writers have many forms of collyria, epithems, &c. which they used upon this occasion, but issues and setons they lay great stress on, which practice may immediately satisfy us what was their opinion of the nature of the disease. "Omnium vero præstantissimum est setaceum, materiam enim "ad oculos fluentem potenter ad se trahit et evacuat, caput ab "omnibus excrementitiis humoribus expurgat, et egregie "corroborat; quid plura, tanti est momenti ut inveteratam "fistulam lachrymalem sine hoc præsidio vix curari posse."

recourse to such as they thought would hasten the suppuration of the supposed abscess[d].

[d] Mr. Serjeant Wiseman most certainly did not understand this disease, and mistook it either for a tumor of the encysted kind, or for an inflammatory defluxion, and treated it as such: his words are—

" Ægylops is a tumor of the inner canthus of the eye, " either scrophulous, ætheromatous, or of the nature of a " meliceris, or sometimes with inflammation: the causes of " Ægylops are the same that produce the like tumor in other " places, but sometimes it is made by fluxion, and appeareth " first as a plegmon: if it be struma or ætheroma, it is made " by congestion."

" The indications of cure are taken from the Ægylops, " whether it be in its beginning with inflammation, or by " congestion, passing its matter forth under the cilium into " the eye, in which case it is fistulated. Anchylops has also " its peculiar way of treating, as other tumors of the glands."

Without any design to criticise on the strange unintelligibility of the Serjeant's language, I believe I may venture to say, that no man who is not previously acquainted with the nature of the disease, will learn from hence that its seat is in the lachrymal sac, and that an obstruction in the nasal duct is the first cause of it.

To come still nearer, or even into our own time, Dr. Daniel Turner compiled a treatise of surgery, which was universally dispersed, and read all over the kingdom, and was at that time generally looked upon as a true representation of the London practice: the Doctor says, " Anchylops or Ægylops " are diseases of the internal canthus of the eye, in which the " lachrymal gland is concerned, and from whence the fistula " of the same part is denominated: the prognostic may be " gathered from the method of cure, in which, universals " premised, such as bleedings, purgings, &c. you may " attempt to dissolve the humour by some gentle anodyne, " or discutient cataplasm; but if it inflame and suppurate, " you must hasten maturation, as well as the discharge, by

By the improper use of medicines of the latter kind, it frequently happened that the skin became inflamed and burst; the discharge which necessarily followed this accident, together with the heated appearance of the parts about, confirmed their opinion of a collection of matter within; and according to such supposition, they attempted to obtain a cure by dilating the orifice, and endeavouring to make an incarnation from the bottom of the hollow: not being acquainted with the situation or use of the nasal duct, they took no care to free it from the obstruction under which it laboured, but dressing the sore like a common imposthumation, permitted it either to be filled up with a loose fungus, or to contract itself to a narrow fistulous orifice, which daily discharging a discoloured kind of fluid, and not healing by such means as they made use of, they concluded the

" reason of the part it lies upon; but when, notwithstanding " all your endeavours to incarn and agglutinate, the matter " continues to discharge itself, not only by the outward " orifice, but also under the cilium into the eye, you must try " some more powerful desicative."

I believe no one will venture to say, that the nature and seat of the disease is more or better explained by what the Doctor has said, than by the Serjeant; and I think it is perfectly clear that neither of them had any true idea of it at all: they both mistook the caruncle for the lachrymal gland, and the disease for an encysted, or a scrophulous tumor, which ought to be brought to suppuration; the lachrymal sac, the ductus ad nares, their use, and the disorder of them creating the complaint in question, they were totally unacquainted with.

bone underneath was carious, and made way down to it, either by removing the parts with a cutting instrument, or by destroying them with caustic and cautery, intending to procure an exfoliation, and thereby a firmer basis to heal on[e].

But since the use of the ductus nasalis has been known, since it has been discovered that an obstruction in this is the primary and principal cause of the disorder, and that what passed for the cavity of an abscess is really the sacculus lachrymalis, both the intention of cure and the means have been considerably altered.

In the first and most simple state of the disease, viz. that of mere obstruction without inflammation, much pains have been taken to restore the parts to their natural state and use, without making any wound or division at all; the introduction of a probe, the injection of a fluid, and a constant compression made on the outside of the sacculus in the corner

[e] Humulo summum ejus foraminis excipiendum, et totum id cavum sicut in fistulis dixi, usque ad os excidendum.

CELSUS.

Corpus id quod inter angulum usque ad abscessum est excoluimus, et carnes e profundo educimus; quod si igitur per summa ruptus fuerit abscessus, totum id quod eminet usque ad os excidendum. PAULUS.

Si vero per hæc medicamenta non curetur, aut recediraret postea, signum est quod os est corruptum de subtus, quare tunc oportet locum detegi et os corruptum removeri.

LANFRANC.

of the eye, are the principal means by which this has been attempted.

Some few years ago M. Anel made a probe of so small a size as to be capable of passing from the eye-lid into the nose, being introduced at one of the puncta lachrymalia, and passing through the sacculus and duct; with which probe he proposed to break through any small obstruction which might be found in its passage.

He also invented a syringe whose pipe is small enough to enter one of the puncta, and by that means to furnish an opportunity of injecting a liquor into the sacculus and duct; and with these two instuments he pretended to be able to cure the disease whenever it consisted in obstruction merely, and the discharge was not much discoloured. The first of these, viz. the passage of a small probe through the puncta, has a plausible appearance, but will, upon trial, be found very unequal to the task assigned: the very small size of it, its necessary flexibility, and the very little resistance it is capable of making, are manifest deficiencies in the instrument; the quick sensation in the lining of the sac and duct, and its diseased state, are great objections on the side of the parts, supposing that it was capable of answering any valuable end, which it most certainly is not.

That the passing a fine probe from one of the puncta lachrymalia into the nose is very practicable, I know from experience; but I also know from the same experience, that the pain

it gives, and the inflammation it often excites, are much greater than any benefit which does or can arise from it.

It is said that the principal use of this probe is to clear the little ducts leading from the puncta into the sacculus, and the obstruction of those ducts is often mentioned as a part of this disease; by which one would be led to suppose that it was a circumstance which frequently occurred, whereas it is seldom or ever met with, and when it does happen, can never produce the disease in question, the principal characteristic of which is, a discharge into the inner corner of the eye upon pressure made in the angle: this discharge is made from the sacculus, through the puncta, and proves that the latter are open. The passing a probe therefore through these seems to be perfectly unnecessary, since a stoppage of them would never give rise to that disease, which consists in an obstruction to the passage of any thing from the sac into the nose, and not from the eye into the sac.

The syringe, if used judiciously while the disease is recent, the sac very little dilated, and the mucus perfectly clear, will sometimes be found serviceable: I have used it where, I think, it has been much so; I have by means of it injected a fluid through the sacculus into the nose, and in two or three instances have effected cures by it: but I have also often used it ineffectually; it gives no pain, and a few trials render the use of it very little troublesome.

Fabritius ab Aquapendente invented an in-

strument, which was so contrived, as by means of a screw to make a pressure externally on the lachrymal bag, from the use of which, he says, his patients received much benefit: this instrument has been considerably improved by late practitioners, and is still recommended as very useful.

All the good that can be obtained by compress and bandage, this screw is capable of procuring; but it is also subject to all the same inconveniencies, arising from the impossibility of determining exactly the due degree of pressure: for if it be so great as to bring the sides of the upper part of the sac into contact, all communication between it and the puncta will be thereby stopt: if it be but slight, the accumulation will not be prevented, nor does it in either case contribute to the removal of the obstruction in the nasal duct, the primary and original cause of the disease.

If the curative intention was to procure an union of the sides of the sacculus, as in the case of parts separated from each other by the formation of matter or sloughs, and the pressure could be made uniformly and constantly, possibly it might be so managed as to answer a valuable purpose: but as that is not the intention, the pressure, whether made by an instrument, or by a common roller and compress, contributes little or nothing toward a cure, nor did I ever see one affected by it, although I have several times tried both.

That some slight obstructions of the nasal

duct have gone off while the compression has been used, I do not deny; but am in great doubt concerning the share which it had in removing them, having seen more than one instance of a cure being obtained by the use of a proper regimen and medicines, in slight and recent cases, where nothing is used externally but a vitriolic collyrium; and having been always disappointed in my attempts at mere bandage of any kind.

Besides these means of attempting a cure without incision, the gentlemen of the French Academy have favoured us with some others, such as the introduction of a probe into the lower part of the nasal duct within the nose, the injection of a fluid by the same orifice, the passing a seton from the punctum lachrymale superius through the sacculus and duct, and out at the nostril, there to remain till the cure is completed; and for those purposes they have invented and given figures of a number of probes, syringes, and many other instruments, which, they say, have been very successfully used: far be it from me to say that they have not, or to prevent any body from trying those, or any other means by which mankind may be cured of diseases with the least possible fatigue and pain; but from the experiments which I have made of most of these processes, I must beg leave to suspend my assent to their general utility, or even to their frequent practicability.

Repeated trials upon dead subjects will undoubtedly enable a man to pass the probe, or perhaps now and then the seton, but he will

also find it often absolutely impracticable; and in the few instances in which he may chance to succeed as to this attempt, what will in general be the consequence? not what the writers on these subjects have taught him to believe, a cure, but a sense of pain and degree of inflammation, which the patient, before such attempts were made, was free from—an exasperation of the disease, and a loss of much time, as I have more than once experienced. To which consideration may be added, that infants and young children are very often afflicted with this disorder, and that such processes as these are absolutely impracticable upon them.

I should be very sorry to be misunderstood in what I now say, to have it suspected, that I mean to derogate from the character of those gentlemen who have been the inventors of these operations, or that I speak slightingly of them, either because they are not my own, or because I have not been able to succeed in the use of them: it would give me great concern if I thought it would be believed that I acted upon so mean, so narrow a principle; no man is or would be more pleased with any real improvement in our art than myself; but having taken all the pains in my power to apply the discoveries of which I am now speaking to practice (the only test of good surgery), and having found them most frequently impracticable, always ineffectual, I think myself obliged to say so.

Anel's syringe I have used successfully, and think it may now and then be very well worth

trying, in recent cases more especially, as it may always be used without giving any pain, or running the risk of raising an inflammation; but I must also beg leave to observe, that if the bag is not much dilated, the mucus clear, the skin and cellular membrane uninflamed, and the parts about soft and easy, if the patient will take care not to suffer too great an accumulation, will, by the frequent use of a vitriolic collyrium, keep the eye-lids clean and cool, and carefully avoid such things as irritate the membrana narium, or occasion a sudden flux of lymph from the lachrymal gland, the disease may for many years, nay often for life, be kept from being very troublesome or inconvenient, without any surgery at all.

SECT. V.

When the disease is got beyond the simple state just described, that is, when the parts round about are much, or constantly inflamed, or the skin covering the tumor is burst, there is something more to be done if a cure be intended.

In this state an opening in the upper part of the sacculus lachrymalis becomes in general absolutely necessary; and as a wound made by a knife leaves a much less disagreeable scar than that which necessarily follows the bursting of the skin, one being a mere simple division, the other a loss of substance, it will always be

found best to anticipate the accident of bursting, by making the opening as soon as the integuments are in such a state as to threaten it[f].

For the making this incision authors have been very particular in their direction with regard to its place, manner, and form: they have ordered it to be semilunar, having its concave part toward the eye, and that the point of union of the lids should be exactly opposite to the centre of the incision. This lunated figure was calculated to correspond with the course of the fibres of the orbicular muscle, upon a supposition that a transverse section of them would produce an inversion of the lower lid, an effect which never follows. All that the surgeon need observe is, to take care to keep the knife at a proper distance from the juncture of the palpebræ, to begin the incision a very little above a line drawn from that juncture toward the nose, and to

[f] I cannot but be of opinion, that in this case, and many other abscesses, the opening which nature makes from within generally heals with less scar or mark than that which is made by a cutting instrument. It is certainly in many cases wrong to let matter remain after it is palpably formed; as in some situations it is capable of doing injury to the parts on which it is situated. I only mean to say, that when matter may be safely left till it makes its own way out, the scar is not so visible as when an opening is artificially made; as, except in those cases where from violent inflammation and distention a sphacelus is induced, the natural opening is rather a distraction than a destruction of fibres, or loss of substance. F.

continue it downward: its form may full as well be straight as any other, and the best instrument to make it with is a small crooked bistory.

If the sacculus is already burst, the place of opening is determined, and the orifice may be enlarged with a knife, or dilated.

The incision made, the sacculus should be moderately distended, either with dry lint, or a bit of prepared sponge; by which means an opportunity will be gained in two or three days of knowing the state of the inside of the sac, and of the ductus nasalis: if the former is neither sloughy nor otherwise diseased, and the obstruction in the latter but slight, it sometimes happens, that after a free discharge has been made for some days, and the inflammation occasioned by the first operation is gone off, the sac contracts itself, a superficial dressing, with moderate pressure, heals the sore, the lachrymal fluid resumes its wonted course, and the disease disappears.

Of this I have seen more than one instance, and perhaps it would happen oftener, if the very absurd manner in which this disorder is generally treated after opening the bag, did not prevent it: in this state success is to be expected from the most gentle treatment only: whatever irritates, inflames, or destroys, will infallibly prevent it.

If this simple method does not succeed, or from the state of the parts seems unlikely to do so, another must be tried, which the opening

already made will enable us to put in practice: the point to be aimed at is, if possible, to render the nasal duct pervious to the lachrymal fluid; and we must endeavour to obtain this end by such means as give the least pain, excite the least inflammation, and leave the parts as near as possible in their natural state; that is, we are to endeavour to dilate the passage from the sac to the nose, by some means which will gradually distend it without destroying its texture, in the same manner as the dilation of the urethra ought to be effected in the case of strictures, by passing either a probe, or a piece of cat-gut, or a bougie, gently into it, as far as it will easily go, and repeating it occasionally until it is got quite through and the passage is free[s].

Every man will determine for himself, by what means he will endeavour to accomplish this end; nor is it of very material consequence which he prefers, provided it be done gradually, and without giving pain: a proper dilatation of the upper part of the sacculus by dry lint, or a bit of prepared sponge, will be found useful previous to the attempt toward passing any thing into, or through the duct; and it will also

[s] This caution is very necessary to be observed in the cure of strictures of the urethra, in which case the proper intention is gradually to dilate the passage, and to procure an increased discharge of mucus from the lacunæ; this should always be done gently, and by means which give as little pain as possible; whatever irritates or gives pain will certainly do mischief, will add to the obstruction, and increase the dysury,

be necessary that the surgeon be possessed of a just idea of the size and direction of it, both in a natural and a diseased state; for whoever has formed one only, from viewing its bony channel in a dry scull, will upon experiment find himself much deceived with regard to its diameter in a living subject; the membrane which lines it is not extremely thin, in a healthy state, and when it is inflamed or thickened by obstruction, the passage through the duct is thereby rendered very small, if it is not quite shut up.

They of our ancestors who mistook this disease for an abscess, and found (as indeed they always must) extreme difficulty in filling it up with sound flesh, generally had recourse to escharotic medicines for the destruction of that fungus which seemed to hinder them from accomplishing their end; by which conduct they irritated all the neighbouring parts, increased the inflammation, and were most frequently frustrated in their expectation of a cure at last. The same kind of medicines were also used by those who supposed the disorder to be an encysted tumor, with intention to eradicate the cyst, which, they thought, prevented a cure by remaining behind; and both these methods of practice were vindicable, supposing their idea of the disease had been a true one, which it most undoubtedly was not: their reasoning was right, but their principles were wrong; they were in general very little acquainted with the structure and use of the

parts, and totally mistook the nature of the disease.

But now, that we are thoroughly acquainted with both, this kind of practice ought surely to cease, as the preservation of the sacculus and duct, and not their destruction, are, or ought to be intended: all cathæretic medicines must be wrong and prejudicial, at least while the intention is such; an intention at all times rational, and sometimes capable of being fulfilled.

Notwithstanding the destruction of the bag is allowed to be wrong by most surgeons of the present time, yet there are many, who, by their manner of dressing it, after they have opened it, do really, though not intentionally, produce the same effect as our forefathers aimed at: it is still a custom with many, as soon as it is opened, to distend the cavity of it with a hard tent, or with dossils of lint charged with escharotic medicines, such as mercurius precipitatus ruber, &c. by which means the inflammation is increased, the skin and edges of the incision hardened, and the inside of the sacculus put under the necessity of casting off a slough. This is one of several instances still remaining of our adhering to old methods of practice, after the principles on which such methods were originally formed, have been allowed even by ourselves to be erroneous; for this manner of dressing the sore is effectively the same as the ancients made use of, while they supposed the disease to be an abscess of the caruncule, and encysted

tumor, or a callous ulcer with carious bone; and was by them intended very properly for the destruction of such callosity, to assist the exfoliation of the supposed caries, and to procure a firm basis to incarn upon.

On the contrary, the point which ought first to be aimed at, immediately after having made an opening into the sac, is to endeavour to remove the obstruction of the natural passage from thence into the nose, by the means already mentioned, which design this method of cramming in escharotic dressings must necessarily frustrate, must frequently render a simple case complex, and at least retard that cure it is designed to expedite.

The only excuse than can be now made for such method of dressing is, that the surgeon is satisfied that the ductus ad nares cannot be restored to its use, and therefore, by destroying part of the sacculus, intends to procure such a generation of new flesh, as may fill up its cavity, and hinder the accumulation or lodgment there in future.

If this was feasible, perhaps it might be a vindication of such treatment; but unfortunately it neither is, nor can be so in general; and whoever will attentively examine the natural situation and structure of the parts concerned, will immediately see why it cannot. All, or the greatest part of the diseased and obstructed duct, lying in its bony channel out of the reach of what is applied to the inside of the sacculus, must prevent the generation of a firm basis at

its bottom, and produce a fresh collection of mucus, which in a short space of time lifts up the cicatrix into a new tumor, and requires the same treatment as if nothing at all had been done.

On the other hand it must not be denied, that now and then a cure has by this means been effected; but it has been so rarely, that it can hardly be admitted as an authority or vindication of so irrational an attempt.

The parts about the eye are most of them of very quick sensation, and easily irritated; all dressings are in fact extraneous bodies, and therefore, when applied to such parts, cannot be too soft and light: suppuration is an act of nature, not of art; and is always best executed when she is least disturbed: this is a general truth, and will hold good in all parts of the body, even where suppuration may be most wanted: but in the present case, in which the lower part of the sac, and all the duct, are often in such state as not to require any suppuration at all, escharotic dressings of any kind, by producing inflammation both of the eye and caruncule, by rendering the edges of the sore hard, or sloughy, and by destroying the communication between the puncta lachrymalia and sacculus, must necessarily counteract the only proper intention of cure.

I would not in this place be thought to mean, that a mere superficial pledget is all the dressing that is required; no; a moderate dilatation of the upper part of the sacculus is at

first absolutely necessary, in order to get easily at the duct below; but this should be effected without the use of corrosive applications of any kind, and is best accomplished by prepared sponge, which will distend to almost any degree, without destroying.

When a passage has been once obtained, it should be carefully kept open, either by a piece of cat-gut, a small bougie, a leaden probe, or something of that sort; and when it is thoroughly established, the sore may be permitted to contract, until it becomes no more than what serves for the introduction of the bougie into the duct; in this state I would advise, that it be kept open for some time, injecting now and then a little aqua calcis, softened with mell. rosar. through from above into the nose; and when it appears that the passage is so free, and so well established, that there is good probability of its preserving itself, the orifice in the angle of the eye, by being covered only by a superficial bit of plaster, or pledget, will contract and close; and if during its closing, moderate pressure be used on the sacculus, to prevent a fresh accumulation of mucus, it will assist the cure.

Whether the sacculus in a healthy and undilated state, is endued with any degree of contractile power, which it loses by being distended, or to what other cause it may be owing, I know not; but I have more than once been foiled in my attempts towards this method of curing the disease, by a fresh col-

election of mucus, notwithstanding the nasal duct has remained open, as appeared by the discharge made into the nose upon pressure on the tumor, the immediate subsidence of the said tumor, and the passage of an injection, or small probe, after having again opened the sac. Some of these have, upon being again healed, remained good cures, and others not; the uncertainty which attends these cases is great, and the event never to be known but by experiment. Whoever says that none of them are to be cured by the foregoing method, errs as much as he would who should expect it to succeed in all. Where the disease is in such state as to admit its being tried, it is very well worth while, as it is not painful nor tedious; and where it does not answer our expectations, it is no hindrance to any other more efficacious one being made use of afterward: in all these cases, different circumstances in the patient, or in the state of the diseased parts, must produce a variation in the necessary treatment, both in general and particular: a bad habit will require the use of internal remedies; the combination of other diseases of the neighbouring parts will add to the difficulty and trouble; and even the fairest, and such as seem most likely to succeed, do sometimes resist this, and indeed every other attempt.

From the necessity of keeping the eye bound while dressings are applied for the dilatation of the sacculus, an inflammation is frequently raised. This, added to the necessary discharge

of serum, mucus &c. is apt to heat and excoriate the parts about; therefore, warm fomentations, cooling collyria, epulotic cerates, and renewing the dressings as often as shall be necessary, with whatever else can contribute towards keeping the skin clean and cool, must be found serviceable as well as pleasant, and should never be neglected.

SECT. IV.

THE last state which I mentioned of this disorder, is that in which the natural passage from the sacculus to the nose is so diseased as to be quite obliterated, or in which the bones are sometimes found to be carious.

The methods hitherto described have all been calculated to preserve the natural passage, and to derive the lachrymal fluid again through it; in this attempt they are sometimes successful; but when they are not, there is no chirurgical means left, but to attempt the formation of an artificial one in its stead.

The upper and hinder part of the sacculus lachrymalis is firmly attached to the os unguis, a small and very thin bone just within the orbit of the eye; which bone is so situated, that if it be by any means broken through, or removed, the two cavities of the nose and of the orbit communicate with each other, consequently the os unguis forms the partition between the hinder part of the lachrymal bag, and the upper

part of the cavity of the nose; and it is by making a breach in this partition that we attempt the formation of an artificial passage for the lachrymal fluid.

This operation, if considered merely as a perforation, is no invention of the moderns; the ancients undoubtedly performed it: but though it was executed much in the same manner as it is now, yet it was not done with the same intention.

From the accounts which our ancestors have left us of the disease in question, it is plain, that they supposed it to be always attended with a degree of callosity, and often with caries, and that the surest way to obtain a cure was to lay the bone bare: this they effected either by caustic or cautery, according to the humour of the surgeon, or the fears of the patient. If caustic applications were used, they waited the separation of the eschar; and if they found, or believed, the bone to be altered, they applied an actual cautery to it: if the bone to which the iron was applied was the os unguis, it was too thin to bear much heat, or much pressure, consequently was easily burnt, or broke through, and by that means an opening was made into the nose; a terebra was also sometimes made use of instead of cautery, and the same effect produced thereby[h].

[h] Oculo et cæteris junctis partibus bene obtectis, os ferramento adurendum est vehementius: quod si jam carie vex-

By each of these methods, a passage being made from the sacculus lachrymalis into the nose, a cure was sometimes accidentally obtained; but the cautery was applied, either to destroy the supposed callosity, or to desquamate a caries; and the terebra, either for the same reason, or to make a passage for the discharge of matter, which lodged, and as they thought hindered the healing of the sore; for as they were not acquainted with the natural passage of the lachrymal fluid, it would be absurd to suppose, that by means of this perforation they intended the formation of an artificial one. Callosity and caries were their two characteristics of the disease; the dissolution of one, and the exfoliation of the other, were all they had in view from the use of either caustic or cautery, and the perforation of the os unguis was either

atum est, quo crassior huic squama abscedat, quidam adurentia imponunt. CELSUS.

Cum isto pulvere in veritate fere mortificabam omnes fistulas curabiles, et cum cauterio ferreo, aut æneo — factâ mortificatione tali totius carnis usque ad os, cum pulvere aut unguento superdictis superpone mortificato butyrum et escharâ aspice, et si fuerit os corruptum cauteriza ipsum usque ad ejus profundum. GUL. de SALICETO.

Postea si homo fuerit delicatus, per istud foramen mittatur Canellus ferreus vel æneus subtilis usque ad profundum si poteris, et per ipsum canellum ferrum candens immitte et fistulæ radices decoque: at si timuerit ignem immittatur pillula de unguento ruptorio. ROLANDUS.

Osse detecto ferrum imprime calidum supra ipsum, et ipsum cauterium mediocriter comprimendo, postea imple totum vulnus cum oleo rosarum misto cum vitello ovi. LANFRANC.

accidental, or made merely for the discharge of matter[i].

Indeed, if we attentively consider what the old writers have left us on this subject, it will appear, that though they knew that a passage into the nose was sometimes a consequence of their use of the terebra and cautery, yet the operators had no very accurate knowledge of the

[i] Fabritius ab Aquapendente, who in general copies Paulus, speaks of the perforation as meant only to make a depending orifice for matter, "Post carunculæ et loci excisionem, terebra "humorem aut pus in nares derivarint."

FAB. ab AQUAPENDENTE.

Gul. de Saliceto, and indeed many other of the ancient writers, speak of using both cautery and terebra to the purpose of deriving the matter and sanies which lodge in the sac, into the nose; and, by making a depending orifice, to procure a firm basis to heal on. "Aspice os, et si fuerit "corruptum cauteriza ipsum usque ad ejus profundum, et con- "cavitatem cum cauterio punctuali, et perfora ipsum ad aliam "partem, ejus ut sanies per nasum fluat, deinde incarnetur "et consolidetur." GUL. de SALICETO.

Indeed, the formation of an artificial passage for the lachrymal fluid could make no part of the intention of those who were not rightly acquainted with the natural one.

Paulus mentions perforation with the terebra as the practice of some in his time; but from what he says, it is plain he did not practice it himself, or think it necessary, and that he regarded it only as a method of making a depending orifice; his words are, "Quod si jam carie vexatum est, ferro candenti, "acuto, ac in cuspidem abeunte adurimus spongiâ frigidâ "madente oculo imposita.

"Sunt qui post carunculæ excisionem terebra usi humorem "aut pus in nares derivarint; nos autem satis habuimus eous- "que solum ferramentis ad Ægylopem accommodatis adurere "ut squama abscederet."

PAULUS ÆGINETA.—See also FAB. ab AQUAPENDENTE.

parts they made so free with; no precise idea of the bone on which their instruments were applied, or through which they passed; nor of the place most immediately proper for such application of them: sometimes they perforated the os unguis very properly, sometimes the cautery or terebra was thrust into the bony channel of the natural nasal duct, and sometimes they were applied to the nasal process of the maxilla superior: the direction given by most of them to rasp the bone (scalpris abradere) and to impress the cautery with some force, that the bone may be sooner exfoliated (*ut citius squama abscedat*), plainly prove, that either they were not aware of the tender structure of the os unguis, or that they did not intend to apply their instruments to it: if the former was the case, the perforation was accidental; if the latter, they must have often done much more harm than good; that is, they must have burned and destroyed unnecessarily, parts which have little or nothing to do with the disease; and by such treatment of them must have much oftener prevented than accomplished a cure[k].

[k] Petrus de Marchetti, though perfectly sensible that the os unguis was often broken through by the cautery, yet insists upon it, that it served no other purpose than to hasten exfoliation. "Præterquam quod hujus perforationis non alius "sit usus quam ut os perforatum aut inustum citius abscedat. Ob- "servandum tamen non esse perforandum os nisi præsente "maxima ipsius corruptione, sola siquidem ejus superficie "corrupta aut altera sat fuerit partem læsam abradere."

PETR. de MARCHETTI.

And Mr. Verduc, a very modern writer, is also of the same

The intention of the present practitioners in making this perforation is different from that of our ancestors; but it is more rational, and founded upon the nature and use of the parts concerned in the disease: it is to form and maintain a new artificial passage from the lachrymal bag into the nose, when the natural one can no more be rendered useful, and without any view to any thing else: this, I say, is the aim of them all; but though they are perfectly agreed in their intention, yet they are not so with regard to the instrument which they use, some still continuing the actual cautery, others using other different instruments.

The ancients preferred the cautery, for reasons which have already been assigned; but since the symptoms of callosity and caries have been found to be very infrequent, and the os unguis has been perforated solely with a view to make an artificial passage into the nose, the cautery has with many lost much of its ancient credit, and other instruments have been substituted in its place, which give less pain at the time of using, and leave less deformity afterward.

But though many have laid aside the hot iron, yet it still has its advocates, who prefer it to every other instrument, and who have therefore endeavoured to obviate its inconveniences: they have directed that the cannula through which

opinion, " Le mellieur remede pour amorter l'acide qui cause " la carie, c'est de passer legerement un cautre actuel sur l'os " sans le percer."

it passes be made of a conical form, and so large at its lower end, as that they shall not touch each other; they have ordered this cannula to be wrapped round with wet rag, at the time of using it; they have placed a check upon the top of the iron to prevent its point from going too far, and have been particular in directing us to withdraw it as soon as it is got through.

But notwithstanding these and every other caution, the cautery gives great pain at the time of using; it lengthens the attendance, and most commonly produces unnecessary deformity even in the hands of the most dexterous; not to mention the horror occasioned by thrusting a hot iron into the corner of the eye.

When the inconveniences arising from the use of this instrument, even in the best hands, are important, it may be easily guessed what they must be in those of the clumsy and ignorant; and therefore, unless some real advantage attends it, it ought certainly to be so discouraged, that no one may attempt to revive it. Let us then see with what intent it has been used by those who have appeared most fond of it, and who may fairly be supposed to have best known how to manage it.

The defence made by the wet rag against the heat of the iron, the disproportioned size, and the figure of the cannula, very plainly show, that its effect is designed to be executed

by the point only; and the check at the upper end as clearly shows, that that point is designed to pass no farther than just through the bone, while all the ill effects are occasioned by the upper part of the cautery on the eye-lids and angle of the eye. Now, if it be not designed to produce any effect on any of the parts through which it passes down to the bone, but merely to burn through that and the membrana narium, and thereby make an opening into the nose, I do not see how it differs from any other perforator of equal size, except in the mischief it does to the parts above, which it should not affect.

It does indeed burn the bone and membrane, through which it pierces, and thereby prevents the orifice from closing again immediately; and this is certainly the principal end of perforation, by whatever instrument it is performed; but it is also as certain, that the same end is obtainable by means less mischievous and less horrible.

Our ancestors had a very plausible reason for using it: their ideas of callosity and caries always accompanied this disease, and authorised them to make use of such applications as they thought most proper in such cases: but now, when we know that these are symptoms which very rarely occur, or even if they do, that they are removeable in a much easier manner, we are no longer vindicated in continuing an alarming and a painful process, when we can obtain the same end by much gentler

means; for whether the membrana narium be burnt through, or divided in any other manner, it is the future method of dressing that opening that must maintain it, let it be made by whatever instrument, or in whatever manner it may.

The late Mr. Cheselden was a warm patron of the cautery, took a great deal of pains to prevent it from doing mischief, and has said in its defence, that—"other methods of curing "this disease have been much recommended, "though often unsuccessful; but this, well "performed, is infallible." After so positive an assertion, I am sorry to be obliged to say that it is contradicted by manifold experience; that there have been many instances of perfect cures performed without the use of a cautery; and that some of those who have been cauterised by Mr. Cheselden himself, have been disappointed in the expectation of one: nor could he, with all the pains he took, prevent the effect of the heat of the iron, or leave his patient without a weeping eye.

The intention is merely to make an opening through the os unguis and membrana narium into the cavity of the nose, and to treat that perforation in such a manner as that it shall most probably remain open, and give passage to the lachrymal fluid from the puncta, after the external sore is healed.

The extreme thinness of the bone renders the passage of the instrument very easy, and if the breach which is made be of any tolerable size,

I am inclined to think that it never is filled up again by bone; but that when it is closed, it is by the membrane; and therefore it is the surgeon's business to make a pretty large opening in the bone, and to prevent its being closed again, by rendering the edges of the membrane on each side of it callous.

To make this opening, many different instruments have been devised and used; a large strong probe, an instrument like a common gimlet, a curved trocar, &c. &c. each of which, if dexterously and properly applied, will do the business very well; the one necessary caution is, so to apply whatever instrument is used, that it may pierce through that part of the bone which lies immediately behind the sacculus lachrymalis, and not to push up too far into the nose, for fear of injuring the os spongiosum behind, while it breaks its way.

For my own part, I have always used the curved trocar, which has served my purpose well, and from which I have never experienced any inconvenience: in using it the point should be turned obliquely downward, from the angle of the eye toward the inside of the nose; the accomplishment of the breach will be known by the discharge of blood from the nostril, and of air from the wound upon blowing the nose. The most precise direction in this part of the operation will be of but little use to him who has no idea of the natural structure and disposition of the parts concerned, and who ought therefore to get such information as soon as

he can: but whoever is at all acquainted with this matter, or will attend to the situation and connexion of the os unguis, knows that this bone is divided into two parts by a perpendicular ridge; that the lachrymal sac is connected to all that part which is anterior to this ridge; and that the posterior part of the bone contributes to form the orbit of the eye, and has little or no connexion with the lachrymal sac: the trocar must be applied therefore to that part of the bone which is anterior to the ridge, and consequently behind the lachrymal bag. By the passage of the instrument, all this part of the bone will in all probability be broken, but from which no mischief will ensue.

An attention to the natural situation of these parts will also show the practitioner, that if the point of his instrument be passed in a transverse direction with regard to the nose, the os spongiosum superius will be unnecessarily wounded or broken; and if it goes in too perpendicular a direction, it may get into the channel of the natural duct, and its point will be stopped by bearing against that part of the maxilla superior which contributes to the formation of that channel.

It has been objected to the trocar, that it may break the os unguis to some distance from the place where its immediate point is fixed: to which I can only answer, that I have performed the operation a great number of times, and never yet have seen any inconvenience to arise from it: indeed, a total removal of

a small piece of the bone would be a thing rather to be wished for than avoided. If we may reason by analogy, it seems to be a necessary requisite toward preserving a future passage; for we very well know, in a caries of the bones forming the roof of the mouth, that they are sometimes bare for a large compass, and by casting off leave a considerable aperture into the nose; yet, in many cases, when the virus is removed, and the habit recruited, that opening will so contract as not to suffer a small quill to pass where you might have introduced your finger, nay often will quite close; and therefore, though the opening made in the os unguis may possibly in spite of all endeavours be again closed up, yet a free breach in it seems to be the most likely means to prevent it; and upon this principle I have always turned the perforator round very freely whenever I have used it; have never seen any mischief from it; and do attribute the success I have had with it, in some measure, to this method of using it.

As soon as the perforation is made, a tent of lint should be introduced, of such size as to fill the aperture, and so long as to pass through it into the cavity of the nose: this should be permitted to remain in two, three, or four days, till the suppuration of the parts renders its extraction easy; and after that a fresh one should be passed every day, until the clean granulating appearance of the sore makes it probable that the edges of the divided membrane are in the same state. The business now is

to prevent the incarnation from closing the orifice, for which purpose the end of the tent may be moistened with spir. vitriol. ten.; or a piece of lunar caustic so included in a quill, as to leave little more than the extremity naked, may at each dressing, or every other, or every third day, be introduced; by which the granulation will be repressed, and the opening maintained: and when this has been done for some little time, a piece of bougie of proper size, or a leaden cannula, may be introduced instead of the tent, and leaving off all other dressing, the sore may be suffered to contract as much as the bougie will permit, which should be of such length, that one extremity of it may lie level with the skin in the corner of the eye, and the other be within the nose.

The longer time the patient can be prevailed upon to wear the bougie, the more likely will be the continuance of the opening; and when it is withdrawn, the external orifice should be covered only by a superficial pledget or plaster, and suffered to heal under moderate pressure.

There is another method which has been much recommended by some French writers to prevent the closing of the opening in the os unguis: which is, to introduce a cannula either of gold or silver, or lead, into the aperture, and to permit the sore to heal over it, suffering the cannula to remain, or to come away by the nose.

For my own part, I cannot say any thing to

it, having never had occasion to try it; the cases of this kind which I have had under my direction, having generally succeeded under some of the methods already mentioned; which methods will frequently prove successful, if the surgeon is clear in his attention, pursues it steadily and properly, and refrains from doing too much; though I must again repeat what I have said before, *viz.* that there is no method of treating this disorder which is infallible, none that will absolutely and in all cases prevent a return, especially in scrophulous habits; yet, when a just distinction is made between those cases which are in their own nature incapable of cure, and those which by being improperly treated are not cured, I am inclined to believe, that the number of the former will be found much smaller than it is generally imagined[1].

[1] It must appear to whoever has perused the foregoing tract, that the author took great pains and bestowed much attention on it. His accurate description of the disease rescued it from the obscurity with which it had been enveloped; and the method of cure which Mr. Pott proposed, was a great improvement on the awkward, painful, and destructive operations which had been practised by Mr. Chesselden, and others of his predecessors.

But I must confess that I never was perfectly satisfied with it: I attended many of these cases with Mr. Pott, and in several the artificial passage through the os unguis became obliterated soon after the bougie was left off, though it had been worn a considerable time; in consequence of which sometimes a fresh collection of mucus was formed, producing inflammation and suppuration. In others, where no great inflammation ensued, the tears not finding a passage, again took

heir course down the cheek. It was, however, as before observed, a great amendment on the operations which had preceded, and has laid the foundation of the improvements which have taken place since the time when it was written.

The introduction of metallic tubes, which have been since recommended by other writers, have also been found inadequate to the purpose, as either from the tubes shifting their position, or from their being filled with inspissated mucus, the tears were prevented from passing.

The nail-headed style which Mr. Ware has recommended in his valuable work on the fistula lachrymalis must be allowed to be a great improvement, and in my opinion the best method of treating the complaint. The opening for the introduction of the style is small. The style acts as a capillary tube, by attraction, and readily conducts the tears into the nose—it may be taken out as often as it may be necessary to clean it, and the duct may be washed by a syringe—the style may be worn as long as may be thought necessary, as it creates little disfigurement, appearing only as a small black patch. E.

SOME FEW

GENERAL REMARKS

ON

FRACTURES

AND

DISLOCATIONS.

ON

FRACTURES

AND

DISLOCATIONS.

No part of surgery is thought to be so easy to understand, as that which relates to fractures and dislocations. Every the most inexpert and least instructed practitioner, deems himself perfectly qualified to fulfil this part of the chirurgic art; and the majority even of these are affronted by an offer of instruction, on a subject with which they think themselves already so well acquainted.

This is also the opinion of a considerable part of the people. They regard bone-setting (as it is called) as no matter of science; as a thing which the most ignorant farrier may, with the utmost ease, become soon and perfectly master of; nay, that he may receive it from his father and family as a kind of heritage. We all remember the great, though short-lived reputation, of the late Mrs. Mapp. We all remember, that even the absurdity and impracticability of her own promises and engagements were by no means equal to the expectations and credulity of those

who ran after her; that is, of all ranks and degrees of people, from the lowest labourer or mechanic, up to those of the most exalted rank and station; several of whom not only did not hesitate to believe implicitly the most extravagant assertions of an ignorant, illiberal woman; but even solicited her company; and, at least, seemed to be pleased with her conversation.

The desire of health and ease, like that of money, seems to put all understandings, and all men, upon a level; the avaricious are duped by every bubble; the lame and the unhealthy by every quack. Each party resigns his understanding; swallows greedily, and for a time believes implicitly, the most groundless, ill-founded, and delusory promises; and nothing but loss and disappointment ever produce conviction. Arts, trades, and manufactures, are allowed to be learnt, in general, by those who have employed a proper quantity of time and attention in such pursuits; and it seems most singularly unjust, as well as untrue, to suppose that medical people are the only part of mankind who are all either so dull as not to be able to learn; or so profligately wicked, as not to practise their art to the best of their judgment, and to the greatest possible advantage to mankind.—Surely there are, and always have been among us, as well as in all other classes, men truly able and perfectly honest; men, who well understand the science which they profess; and who practise it not only with great ability, but with strict integrity. I cannot be supposed to say or to mean this as a vin-

dication of every individual. Different men have different powers and capacities. The multitude with us, as with all ranks and degrees (not excepting any) will always be deficient. Advancements in knowledge will always be owing to the ingenuity and industry of a few particular people; but such advancements will always, in due time, more or less influence the rest. They have so done; and notwithstanding that there remains a great deal yet to be done, to bring surgery to that degree of perfection of which it is capable, yet whoever will compare the present practice of it with that of a very few years ago, cannot justly, or with any degree of candour, withhold his commendation from his contemporaries.

I remember, some years ago, to have heard a judge from the bench tell a jury, that he believed a country bone-setter knew full as much, if not more of the matter of his own business, than any, the most eminent surgeon in the kingdom. I will not enter into a disquisition concerning the validity of a judge's opinion. Perhaps his lordship might very little understand the thing concerning which he decided so peremptorily: without either injustice or partiality, I may certainly suppose him to have been a much more able lawyer than surgeon; and I believe it will also be allowed, that general reflexions of this kind are, and must be, the consequences of a petulant attempt to be witty, rather than of conviction; and therefore, at best, are frivolous and idle. But, on the other hand,

I am very willing to allow (what indeed I have already allowed) that many parts of surgery are still capable of considerable improvement; and this part, perhaps, as much as, if not more than, any; it being one of those in which a general observance of, and rigid adherence to, old prescribed rules, have prevented the majority of practitioners from venturing to think for themselves; and have induced them to go on in a beaten track, from which they might not only safely, but advantageously deviate.

The general doctrine, relative to fractures, is contained under the following heads, as parts of the treatment of them:

Extension.
Counter-extension.
Coaptation, or setting.
Application of medicaments.
Deligation, or bandage.
Position.
Prevention, or relief of accidents.

This is the general arrangement of the subject by most of the writers on it, and a very just and proper one it is; but notwithstanding the parade of books under these various heads, much less alteration will be met with, since the times of Hippocrates, Galen, and Celsus, than an inquirer might expect, or than the subject is capable of.

I must desire that what I have said may not be misconstrued. I do not mean that there are

not, and have not at all times, been men of particular ingenuity, who have deviated from the common methods, and have greatly improved the art; but still the common methods are the same, and the multitude of practitioners religiously follow them. Let me not therefore be charged with presumption or arrogance, if I say, that under almost every of the foregoing heads the practice is capable of considerable improvements—improvements, which would show rationality and sense in the surgeon, and produce ease and convenience to the patient.

I am aware that some of my readers may be inclined to charge me with affecting to deviate from the commonly prescribed rules; and to contradict opinions, which a great length of time, and a long succession of writers, have given sanction to.

——————————————— " Quæ
" Imberbes didicere, senes perdenda fateri ;"

is a hard lesson sometimes to human vanity, and what requires some degree of candour to learn. But, on the other hand, if it was not now and then practised, I know not how such an art as surgery (whose basis is experience) could ever be improved. Our ancestors deserve our best thanks for the assistance which they have given us: where we find them to be right, we are obliged to embrace their opinions as truths; but implicit faith is not required from man to man; and our reverence for our predecessors must not prevent us from using our own judgments.

Ancient and modern are mere sounds, and can signify nothing in this case, unless with the former we can connect an idea of truth established and confirmed by time and experience, and with the latter, that of demonstrable improvement upon what has gone before.

If what I have to urge is not capable of being verified and confirmed by experience, it must sink into nothing; but if, upon trial, it shall be found by the majority (as it has been by me and some others) to be not only true and practicable, but highly conducive to the ease and benefit of the afflicted, it ought to have as much weight, though delivered by a living writer, as if it had proceeded from the remotest antiquity: its use, not its date, should give it value. If practitioners, since the time of Albucasis, had been contented with his doctrine, and never had ventured to think for themselves, surgery had not been what it now is, and its great merit would still have consisted in the multiplicity of its hot irons. In short, to such as think that we are seldom or never to deviate from the opinions and practice of those who have gone before us, I shall take the liberty of answering in the words of the great Mr. Locke, who says, "The floating of other men's opinions "in our brains, makes us not one jot the more "knowing, though they happen to be true. "And beaten tracks lead those whose thoughts "reach only to imitation," 'Non quo eundem 'est, sed quo itur.'

Before I enter on the subject, the reader will

give me leave to acquaint him, that it is by no means my intention to write a regular treatise on fractures, although I think the subject well deserving of, and even requiring one. I only mean to throw out a few hints, which I hope may prove intelligible and useful.

The first article, in the general arrangement, is extension; under which may also be comprehended the second, or counter-extension.

In order to accomplish this, we are directed, if the fracture be of the thigh or leg, to place the patient in a supine posture, and the broken limb in a straight one; then, having the upper part of it held firm and steady, by proper assistants, we are ordered, by means of hands, ligatures, lacs, or even in some cases by pieces of machinery, to make such an extension or stretching of the limb lengthways, as shall enable the surgeon to place the ends of the broken bone in as apt, that is, in as even a position, with regard to each other, as the nature of the fracture will admit.—This is a short description of what, in the vulgar phrase, is called setting a broken bone; and is most commonly a painful operation to the patient, a fatiguing one to the operator and his assistants; and what is worse, is in many instances found to be inefficacious; at least, not fully to answer the intention of the one, or the expectation of the other[a].

[a] "Instruments for extension are threefold; first, the surgeon's hands, &c.; secondly, funes and habenæ, a sort of bandage fit to pluck at, in order for extension; thirdly,

Writers in general are very precise and formal in the directions which they have given for the due and proper accomplishment of this purpose. They have told us, that the extension should be made slowly and gradually; and should be continued till the ends of the bone are separated from each other sufficiently to admit of the fracture being set without risk of breaking off any points or inequalities, and to enable us to place them perfectly smooth and even. All this, like many other of the preceptive parts of physic and surgery, is very pretty on paper, but not often found to be practicable in the chamber. The direction to continue the extension until the ends of the bones are at a certain distance, lengthways from each other, plainly implies a considerable degree of violence; the limb must, by such force, be not only made longer than its fellow, or than nature ever intended

" there are organa and machinemata, engines used by us, and " invented by the ancients." WISEMAN.

The very mention of funes, habenæ, organa, and machinemata, implies a force exceeding that of mere hands; a degree of force, which in a fracture never can be wanted if the limb be rightly placed; a degree of force which must, in the nature of things, do mischief; and a degree of force, whose whole effect, however great, must cease immediately upon its being removed; unless the fracture be particularly and luckily circumstanced.

There are not wanting instances of the muscles surrounding a bad though simple fracture, having been torn by extension; and spasm and other mischief thereby produced. See cautions on this subject, laid down by many old writers, particularly by Galen and Albucasis.

it should be, but this procrustian method of lengthening it is ordered to be executed while the limb is in such position as to put all the muscles most on the stretch, and render them least likely to yield to it. Now, not to say a word of the great probability of the points and edges of the fracture wounding the surrounding muscles, or of such wounds being more painful, or worse in their consequences, when inflicted on parts thus stretched, or of the addition that such force must make to the laceration already necessarily made by the fracture; I say, not to mention a word of all this, can the method itself (without considering any accidental, adjunct circumstances) be practised in every fracture, or even in the majority of fractures? Will it be done properly by the rude, the inattentive, and the ignorant? If attempted by such, will it not be, is it not, frequently productive of pain, tumefaction, inflammation, and extravasation; which are set to the account of the nature of the fracture, and to inevitable necessity? and when done ever so properly, will it, can it, in an oblique or splintered fracture, answer the purpose it is intended for, or produce a more happy coaptation?

Whence arise these evils? from whence proceed the difficulty and the so frequent disappointment?

In order to understand this rightly, let us for a moment consider, what is or ought to be meant by the terms extension and counter-extension, and why they become necessary: for if the greater part of the pain attending such method, and the fre-

quency of disappointment, both to patient and surgeon, should be found to arise from this part of the process; and that such part can be either disused without prejudice, or altered with advantage, we ought to think ourselves happy in having it in our power to correct our error.

Neither extension, nor counter-extension, can ever be necessary, on account of the mere fracture, considered abstractedly. The broken ends of the bone or bones are of themselves inactive; and, if not acted upon by other parts, they would always remain motionless. When any attempt is made to put them into motion, they of themselves can make no possible resistance; nor can any be made on their part, save an accidental one arising from the points of the fracture being entangled with each other; and when they have been once, by the hand of the surgeon, placed properly and evenly with regard to each other, they would of themselves for ever remain so. What then is the reason why fractured bones always suffer a greater or a less degree of displacement? why is a broken limb almost always shorter than its fellow? what creates the resistance which we always find in attempting to bring the fractured parts aptly together? whence does it proceed, that when we have done all that is in our power (according to this mode of acting), the ends of the fracture will, in many cases, become again displaced, and lameness and deformity frequently ensue? In short, what are the parts or powers which act on the bones, and which,

by so acting on them, produce all these consequences?

These parts are the muscles, the only moving powers in the animal body. By the action of these on the bones, all locomotion is performed, and cannot be performed without them; and although all bones, when broken, are in some degree displaced and shortened, yet it will always be found, that in proportion as the muscles surrounding, or in connexion with a bone, are strong or numerous, or put into action by inadvertence or spasm, so will the displacement of the ends of such bone, when fractured, be. The even and smooth position of the fractured ends of a tibia, when the fibula of the same leg is entire and unhurt; that is, when the muscles therefore cannot act upon the former; the visible and immediate deformity, when both the beforementioned bones are broken nearly in the same place; that is, when the muscles can act upon, and displace such fracture; the great difficulty frequently met with, in endeavouring to get a broken os femoris to lie even tolerably smooth, and to prevent such broken limb from being much shorter than the other, are, among others which might be produced, such strong, and irrefragable proofs, as need no comment.

From the muscles then, and from them only, proceeds all the difficulty which we meet with in making our extension; and by the resistance of these, and of these only, are we prevented from being always able to put the ends of a fractured bone immediately into the most apt contact.

Let us in the next place consider, what it is which gives to a muscle, or to the principal muscles of a limb, the greatest power of resisting any force applied to them *ab externo*, in order to draw them out into greater length; for whatever that is, the same thing will be found to be the cause of the different degrees of resistance in setting a fracture.

Does not the putting the muscles in a state of tension, or into a state approaching nearly to that of tension, almost necessarily produce this effect? or, in other words, does not that position of a limb, which puts its muscles into, or nearly into such a state, give such muscles an opportunity of exerting their greatest power either of action or of resistance? This I believe cannot be denied. On the other hand, what is the state or position of a muscle which is most likely to prevent it from acting, and to deprive it most of its power of resistance? or what is that position of a limb, which, in the case of a broken bone, will most incapacitate the muscles from acting on, and displacing it; and in the greatest degree remove that resistance which they have it in their power to make to the attempts for the reduction of such fracture? Is it not obvious, that putting a limb into such position as shall relax the whole set of muscles belonging to or in connexion with the broken bone, must best answer such purpose? Nothing surely can be more evident. If this be granted, will it not, must it not follow, that such posture of a broken limb must be the best for making the reduction; that

is, it must be that in which the muscles will resist the least, and be least likely to be injured; that in which the broken bone will be most easily set, the patient suffer least pain in present, and that from which future lameness and deformity will be least likely to happen. A little attention to what frequently occurs, may perhaps serve to illustrate and confirm this doctrine better than mere assertion.

What is the reason why no man, however superficially acquainted with his art, ever finds much trouble in setting a fractured os humeri, and that with very little pain, and a very small degree of extension? Is it not because both patient and surgeon concur in putting the arm into a state of flexion; that is, into such a state as relaxes all the muscles surrounding the broken bone? and is it not for the same reason that we so very seldom see (comparatively speaking of this bone with others) a deformity in consequence of a fracture of it? Let the reduction be attempted with the arm extended from the body, and the difficulty of setting will be much increased: let the arm be deposited in an extended straight position, and the fracture will be displaced and lie uneven.

Apply the same kind of reasoning to the os femoris; that bone whose fracture so often lames the patient and disgraces the surgeon.

Will it not be more cogent, and more conclusive, in proportion as the muscles in connexion with this bone are more numerous and stronger?

I would ask any man, who has been much con-

versant with accidents of this kind, what is the posture which almost every person (whose os femoris has been newly broken) puts himself into in order to obtain ease, until he gets proper assistance? Do such people stretch out their limb, and place their leg and thigh straight, and resting on the calf and heel? I believe seldom or never. On the contrary, do not such people almost always bend their knee, and lay the broken thigh on its outside? And is not the reason, why this must be the most easy posture, obvious?

From want of attention to, or from not understanding these few self-evident principles, many people permit their patients to suffer considerable inconvenience, both present and future.

It is a maxim universally taught and received, that a fractured limb may be in such state, as not to admit of the extension necessary for its being set; that is, if assistance be not at hand, when the accident happens; if they who bring the patient home, do it so awkwardly or rudely as to bruise and hurt the part; if from drunkenness, folly, or obstinacy in the patient, it happens that the limb is so disordered that it is found to be much swollen, inflamed, and painful, it is allowed not to be in a state to admit extension.

This, I say, is a general maxim, and founded upon very just principles; but what is the general practice in consequence of it? It is, to place the limb in an extended, straight

position, to secure it in that, and then by proper means, such as fomentation, poultice, &c. to endeavour to remove the tension and tumor. Now, if it be considered that the swollen, indurated, and inflamed state of the muscles is the circumstance which renders extension improper, surely it must be obvious, that such position of the limb as necessarily puts these very muscles in some degree on the stretch, must be a very improper one for the accomplishment of what ought to be aimed at. Under this method of treatment, the space of time which passes in the removal of the tension, is sometimes considerable; so considerable that a happy and an even coaptation becomes afterwards impracticable; and then this accident, which nine times in ten is capable of immediate relief, is urged as an excuse for unnecessary lameness and deformity.

How then are we to conduct ourselves in such circumstances? The nature of the complaint points out the relief. Extension is wrong; a straight position of the thigh or leg is a degree of extension, and a still greater degree of it in proportion as the muscles are in such circumstances as to be less capable of bearing it. Change of posture then must be the remedy, or rather the placing the limb in such manner as to relax all its muscles, must be the most obvious and certain method of relieving all the ills arising from a tense state of them; which change of posture will be attended with another circum-

stance of very great consequence; which is, that the bones may in such posture be immediately set, and not one moment's time be thereby lost; a circumstance of great advantage indeed! for, whatever may be the popular or prevailing opinion, it is demonstrably true, that a broken bone cannot be too soon put to rights; as must appear to every one who will for a moment consider the necessary state of the muscles, tendons, and membranes surrounding, and the medullary organs contained within a large bone broken and unset; that is, lying in an uneven irregular manner. Can any truth be more clear, than that if the fracture, tension, and tumefaction be such that the muscles cannot bear to be stretched out in the manner necessary for setting the broken bone without causing great pain, and perhaps bringing on still worse symptoms, the more the position of that limb makes its muscles approach toward a state of tension, the less likely it must be that such symptoms should remit, and the longer it must be before the wished-for alteration can happen; and consequently, that while the accomplishment of such purpose is by every other means aimed at, the position of the limb ought most certainly to contribute to, and not to counteract it? In short, if the experiment of change of posture be fairly and properly made, the objections to immediate reduction, from tension, tumour, &c. will most frequently be found to be groundless; and the fracture will be capable

of being put to rights, as well at first as at any distance of time afterward[b].

Extension having been made, and the broken ends of the bone having been placed as smooth and as even as the nature of the case will admit, the next circumstance to be attended to is the

[b] Mr. Pott's recommendation, to lose no time before a broken bone is reduced or set, ought to be adopted by every practitioner; and I earnestly advise, that whoever is sent for to a fractured bone, should never leave it until he has set it, or placed it in the best possible position. I have often heard surgeons say they did not attempt to set a fracture at first, because there was too much inflammation; and I have, in such cases, found the limb lying on a pillow, without even the support of a splint, or at best with a splint placed under a thick pillow, where it could not act; as if splints were entirely useless until the fracture was perfectly reduced. This is a very serious error; for supposing the bones not completely set, splints, properly applied, must undoubtedly give some stability, and tend, in some degree, to prevent the motion of the broken bone until it is set; and which effect must be lost through the intervention of a pillow. I will not say, that after a certain time has passed subsequent to the accident, and owing to some of the circumstances which Mr. Pott has enumerated, a limb may not be so disordered, so swollen, inflamed, and painful, that it would be imprudent, and probably impossible, immediately to alter its position. In that case, we must wait, until, by the assistance of fomentations, poultices, or other proper applications, a favourable alteration takes place; but these circumstances must indeed be very pressing, and the inflammation very great, which can warrant the not endeavouring to get the ends of the bones into a proper position the first time of seeing the fracture; as it is a true and positive fact, that what is most likely to reduce the swelling and inflammation, and far beyond all topical applications, is the even and happy position of the ends of the broken bones. E.

application of some medicament to the limb; particularly to the fractured part of it. In this, different people act differently. Some make use of an adhesive, or what they choose to call a roborant plaster; some, of what is commonly called a cerecloth; others apply spirit. vini, with oil, vinegar, and white of egg; and others the spirit. mindereri, the solution of crude sal ammoniac in vinegar and water, or some such kind of medicine.

To the cerecloth, provided it neither sticks to the skin, nor is capable of irritating it, there can be no objection; neither can there be any to all the others, except the adhesive plaster: that must for ever be wrong upon every rational principle. The intention in applying any kind of external medicine to a broken limb, is, or ought to be, to repress inflammation, to disperse extravasated blood, to keep the skin lax, moist, and perspirable, and at the same time to afford some, though very small, degree of restraint or confinement to the fracture, but not to bind or press; and it should also be calculated as much as possible to prevent itching, an herpetic eruption, or an erysipelatous efflorescence. Adhesive plasters of all kinds, let the composition of them be what it may, are from this one quality the least likely to contribute to any of the good ends proposed, and the most likely to be the cause of the contrary inconveniences, which ought most carefully to be avoided. They obstruct perspiration, they heat the skin, they produce itching, eruption, and inflammation; and if the

fracture be quite surrounded by them, and the limb be from any cause ever so little inclined to swell, they make a tight, painful, and pernicious stricture, much greater even than a roller, and less likely to relax. At St. Bartholomew's hospital, we use a cerate made by a solution of lytharge in vinegar, which, with soap, oil, and wax, is afterward formed into such consistence as just to admit being spread without warming.

This lies very easy, repels inflammation, is not adherent, comes off clean, and very seldom if ever irritates, or causes either herpes or erysipelas. But let the form and composition of the application made to the limb be what it may, one thing is clear; *viz.* that it should be put on in such manner, as that it may be renewed and shifted as often as may be necessary, without moving the limb in any manner: it being certain, that when once a broken thigh or leg has been properly put to rights, and has been deposited properly on the pillow, it ought not ever be lifted up or moved from it again without necessity, until the fracture is perfectly united; and it is as true, that such necessity will not very often occur. This may perhaps seem strange to those who are accustomed to roll simple fractures, and consequently to lift them up every three or four days, in order to renew such kind of bandage: but the necessity of this motion arises merely from the kind of bandage made use of, and not from any circumstance of the fracture itself. That the frequent motion of a fractured limb cannot possibly contribute

to the ease of the patient, will, I suppose, be readily admitted; as I suppose also it will, that when a broken limb has been once deposited in the best position possible, it is impossible to mend that position, merely by taking such limb up and laying it down again; from whence it must follow, that such kind of apparatus as necessitates the surgeon frequently to disturb the limb, cannot be so good as one that does not; provided the latter will accomplish the same kind of cure as the former: the truth of which position will appear in the most satisfactory manner to any who will take a view of the method in which simple fractures are treated at the before-mentioned hospital. Such application having been made as the surgeon thinks right, the next thing to be done is to put on a proper bandage.—That used by the ancients, and by the majority of the present practitioners, is what is commonly called a roller. This is of different length, according to the surgeon's choice, or as it may be used in the form of one, two, or more pieces. Hippocrates used three[c]; Celsus, six; but the present people seldom use more than one. By such kind of bandage three intentions are aimed at, and said to be accomplished; *viz.* to confine the fracture, to repress or prevent a flux of humours, and to regulate the callus[d]: but whoever will reflect

[c] See on this subject Fab. ab Aquapendente, Wiseman, Scultetus, Hildanus, Petit, Du Verney.

[d] "On applique la premiere sur l'endroit meme de la fracture. Son milieu doit repondre au centre. On fait trois

seriously on this matter will soon be convinced, that although some sort of bandage is necessary in every simple fracture, as well for preserving some degree of steadiness to the limb, as for the retention of the applications, yet none, nor neither of these three ends can be answered merely, or even principally, by bandage of any kind whatever; and therefore, if this should be found to be true—that is, if it should appear that whatever kind of deligation be made use of, it cannot be a principal, but only an accessorial kind of assistance, and that in a small degree, and very little to be depended upon—it will follow, that such kind of bandage as is most difficult to be applied with justness and exactitude, such as is soonest relaxed and out of order, such as stands most frequently in need of renewal, and in such renewal is most likely to give pain and trouble, must be more improper and less eligible than one which is more easily applied, less liable to be out of order, and which can be adjusted without moving the limb.

The ancient method of applying the roller in case of simple fracture of the leg or thigh, was to make[e] four or five turns round the fracture

" tours circulaires: ce qui sert affermir cet endroit, qui est le " seul, qui ait besoin d'etre assujetti, comme etant le seul qui " peut se deranger, *et a contenir le suc nouricier, et empecher* " *qu'il ne s'echappe trop abondamment et trop irregulierement a* " *l'entour de la fracture; ce qui feroit un cal tres difforme.*"

DU VERNEY.

[e] See a particular account of this in Fab. ab Aquapendente, and in Serjeant Wiseman.

first, and then to continue the bandage upward and downward, until the whole limb was enveloped properly. This was done in this manner with a double view; to keep the broken ends of the bone in their place, and to prevent the influx of humour. Modern practitioners, although they have the same ends in view, generally begin their bandage from the inferior extremity of the limb, and continue it up to the top. Whether the old or the later method be followed, whether one or more rollers be made use of, the whole is executed while the limb is kept by means of the assistants in the same extended posture in which the coaptation was made, so that the whole bandage is finished before the leg is deposited on the pillow; in the doing all which, if from the tired state of the surgeon[f], or either of his assistants, or if from the aukwardness, or unhandiness of any of the parties concerned, the true and exact position of the limb be at all deviated from, the ends of the bone will again be in some degree displaced, and the bandage, instead of being of use, will become prejudicial, by pressing hard on the inequalities of the fracture: to which let me add, that the roller, especially when applied to a leg, if it be not put on with due dexterity, that is, if it do not sit perfectly

[f] The extraordinary length of time used by some in putting a fracture to rights, renders what I have called the *tired state of the assistants* an object of importance. The good position of the fracture depends as much or more on them than on the surgeon. If the assistant who holds the foot varies from the proper manner, I defy the surgeon to redress the fracture without the concurrence of such assistant.

smooth and even, is the most unequal and worst kind of bandage in use.

These objections, however just, are not the least to which the roller in the case of simple fracture of the leg or thigh are liable; for, as I have already hinted, it must in a very short space of time, even while the parts surrounding the fracture are in the most tender and most painful state, be renewed, and that more than once, which renewal cannot be executed without again taking the limb off from the pillow, again committing it to the hands of assistants, and again running a risk of displacing the fracture: all which, not to mention the repetition of pain to the patient every time such operation is performed, and which must be at least every four or five days, are (as I have already said) very material objections to the roller, even in the most judicious and dexterous hands, and still more so in those of the rude and ignorant.

The prevention of a flux of humours to a broken limb by bandage, is a common phrase; but they who use it, have either no idea at all annexed to it, or a very erroneous one.

If by the points and edges of the broken bone, the muscles and membranes be unavoidably wounded and torn, or if the same kind of mischief be incurred by the inadvertence or indiscretion of the patient, or of those who assisted in getting him home, or from the violence used in extending the limb and setting the fracture, inflammation must be excited, and pain and tumefaction will be the consequence; and these

will continue for some time in every fracture; but that space will be longer or shorter in different cases and under different circumstances: evacuation, rest, and a favourable position of the limb, will, and do in general, remove all these complaints; but bandage can contribute nothing more than by keeping the applications in their proper place; so far from it, that if the bandage be a roller, it must by the frequent necessity of its being adjusted, and the frequent motion of the limb, in some degree counteract the proper intention of cure.

The old writers are in general very precise as to the number of days during which the roller should be suffered to remain without being shifted; and the number of times which such shifting should be repeated within the first fortnight[g]. This exactitude is by no means necessary; but if the bandage be supposed to be of any use at all, it is obvious, that it ought to be renewed or adjusted as often as it may cease to perform the office for which it is designed, or whenever it shall be found to counteract such office; that is, as often as it shall become so slack as not to contain the fracture at all; or whenever the limb shall be so swollen, that the roller makes an improper degree of stricture. The former generally occurs every

[g] "Tertio die a deligatione facta, Hippocrates fascias re-
" solvit, &c. Facta bona deligatura et pruritu non insectante,
" a tertio usque ad septimum oportet ægrum deligatum deti-
" nere.

" Septimo membrum rursus solvendum, perfundendum aqua
" tepida, et ligandum." FAB. ab AQUAPENDENTE.

four or five days: the latter is most frequent within the first week.

In most of the writers on the subject of fractures, we also find marks or signs laid down for our information concerning the due or undue effect of the bandage on the limb. They tell us, that when that part of it which is below the termination of the roller does not swell at all, that the bandage is not sufficiently strict, and will not retain the fracture; that when the same part is considerably swollen, or tense, or inflamed, it implies, that the binding is too straight; and that a moderate degree of tumefaction is a sign that the deligation is properly executed[h].

In consequence of these precepts, many practitioners look more anxiously after this degree of tumefaction, than after the true and exact position of the limb; and cannot be induced to believe, that any thing can be wrong under this appearance; although, if they would for once assume the liberty of thinking for themselves,

[h] See on this Fab. ab Aquapendente, who speaks or rather copies the sentiments of Hippocrates and Celsus. "Terminus "in stringendo debet esse bona laborantis tolerantia: ut deli- "gatum leviter premat, et sic tum contineat et stabiliat frac- "turam, tum humores exprimat. Sunt etiam alia hujus signa, "quæ altero die apparent; si enim æger eo die quo deligatus "sentiat se valentius stringi, postero vero die tumor laxus, "mollis et parvus appareat, bona est deligatio, quia jam hu- "mores a parte fracta sunt expressi. Si vero aut nullus tumor "aut magnus et durus postridie in manu vel pede appareat, "prava est deligatura; quia illa non continet, hæc vero nimis "arcta est et inflammationem movet. Id notandum, fascias "magis stringi debere in parte fracta quam alibi, ut pars "fracta magis illæsa servetur, ab humorum defluxu."

they might be convinced, that even this degree of swelling is wrong; that it implies some kind of obstruction to the circulation, and cannot serve any good purpose; and consequently, that as far as it may be supposed to be the effect of bandage, so far that bandage must be faulty.

The third purpose for which the roller is said to be used, is the regulation and restraint of the callus.

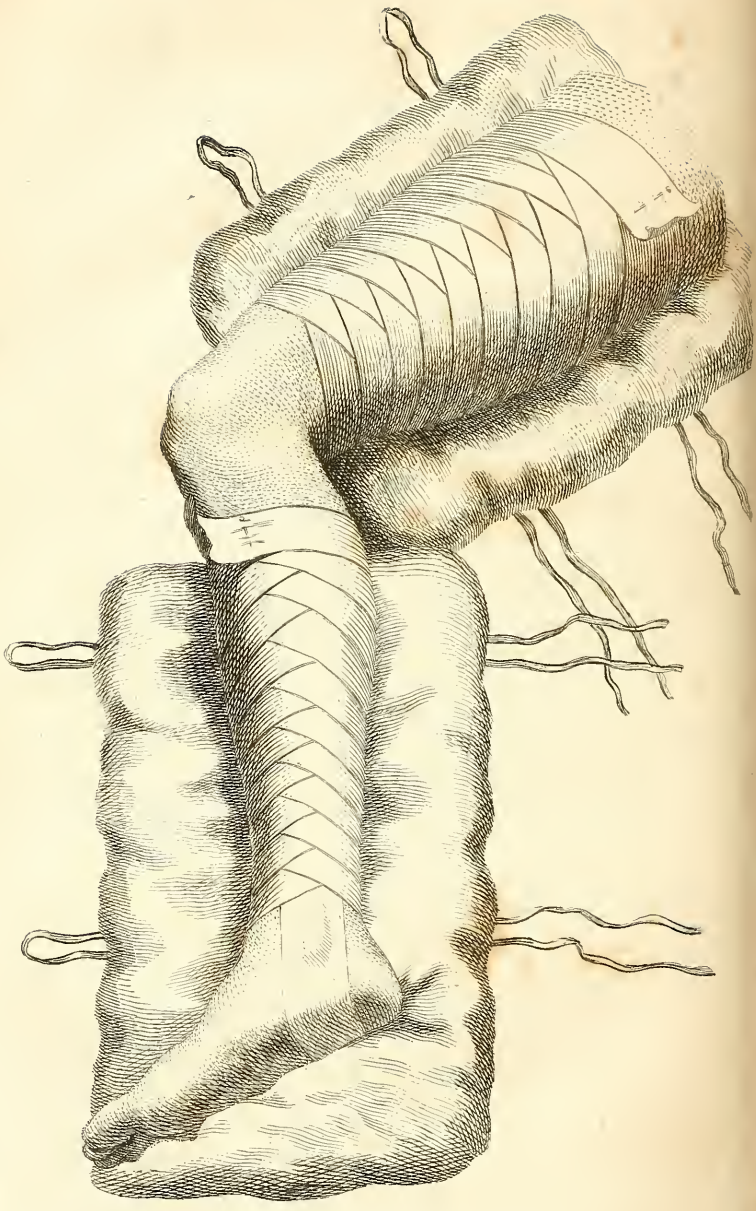
If we were to form our notion of callus by what the generality of writers have said on this subject, we should suppose, that it was not only a particular juice always ready for the purpose, but that, if not restrained and regulated by art, it would always flow in such quantity, as to create trouble and deformity; that there were specific remedies for increasing or decreasing it; and that it always required the hand and art of surgery to manage it. That the callus is so far a particular juice, as that it consists of whatever is destined to circulate through the bones for their particular nourishment, is beyond all doubt; and that this gelatinous kind of fluid is the medium by which fractures are united, is as true; but that it requires art to manage it, or that art is in general capable of managing and directing it, is by no means true. That this callus or uniting medium does oftentimes create tumefaction and deformity, or even lameness, is true also; but the fault in these cases does not lie in the mere redundance of such juice; it is derived from the nature of the fracture, from the inequality of it when set, and from the inapt position of the broken ends with regard to each

other; nor is surgery or the surgeon any otherwise blamable in this case, than as it was or was not originally in their power to have placed them better. It is the inequality of the fracture which makes both the real and apparent redundance of callus, and the tumefaction in the place of union. When a bone has been broken transversely, or nearly so, and its inequalities are therefore neither many nor great, when such broken parts have been happily and properly coaptated, and proper methods have been used to keep them constantly and steadily in such state of coaptation, the divided parts unite by the intervention of the circulating juice, just as the softer parts do, allowing a different space of time for different texture and consistence. When the union of a broken bone under such circumstances has been procured, the place where such union has been made will be very little perceptible; it will be no deformity, nor will it occasion any inconvenience. It will indeed be discoverable, like a cicatrix of a wound in a softer part; but there will be no redundance of callus, because none will be wanted: neither will there be any necessity for any particular management on the part of the surgeon, to repress or keep it in order. But when a bone has been broken very obliquely or very unequally, when the parts of a fracture are so circumstanced as not to admit of exact coaptation, when such exact coaptation as the fracture perhaps would have admitted has not been judiciously made, when from unmanageableness, inadvertence, or spasm, the proper position of the limb has not

been attended to or preserved, in all such cases there must be considerable inequality of surface; there must be risings on one side, and depressions on another; and in such cases the juices circulating through the bone, cannot accomplish the union in the same quantity, the same time, or in the same manner. The broken parts not being applied exactly to each other, there cannot be the same aptitude to unite; and, according to the greater or lesser degree of exactitude in the coaptation, that is, according as the ends of the bones are, or have been placed more or less even with regard to each other, will the inconvenience and the deformity be; and still most where the fracture is not set at all: but the broken ends of the bone unite laterally, or by touching each other's sides. The reason of all this is so obvious, without having recourse to a particular specific juice under the name of callus, that it would be an insult upon the reader's understanding to explain it further[i]. The periosteum covering every fracture will remain thickened for some time, and a degree of fulness or rising will be thereby caused about the place where such fracture has been united; but time, and the use of the muscles, soon in general remove this.

In short this doctrine of callus, considered as a particular kind of juice, and as being liable to great redundance if not prevented by art, has not

[i] On the subject of callus, the editor of Du Verney tells a story from Galen, and which himself seems not to disbelieve, *viz.* that a callus in a particular case was so redundant as to transude through the skin, and to keep the compresses constantly wet.



E

only misled many people, but has often been made use of as a cover to ignorance and neglect. When lameness and deformity have been the consequences of one or both these causes, more than of the nature and circumstances of a fracture, the callus has been found ready at hand to take the blame; and the ideal exuberance of this cement has often been urged as an excuse for real want of knowledge, or for gross neglect.

The best and most useful bandage for a simple fracture of the leg or thigh, is what is commonly known by the name of the eighteen-tailed bandage [k], or rather one made on the same principle, but with a little difference in the disposition of the pieces. The common method is to make it so, that the parts which are to surround the limb, make a right angle with that which runs lengthways under it; instead of which, if they are tacked on so as to make an acute angle, they will fold over each other in an oblique direction, and thereby sit more neatly and more securely, as the parts will thereby have more connexion with and more dependence on each other. In compound fractures, as they are called, every body sees and acknowledges the utility of this kind of bandage preferable to the roller, and for very obvious and convincing reasons, but particularly because it does not become necessary to

[k] Perhaps more properly the many-tailed bandage, as the number of tails or ends must depend on the length of the limb, and other circumstances relative to the fracture. E.

lift up and disturb the limb every time it is dressed, or every time the bandage loosens.

The pain attending motion in a compound fracture, the circumstance of the wound, and the greater degree of instability of parts thereby produced, are certainly very good reasons for dressing such wound with a bandage, which does not render motion necessary; but I should be glad to know what can make it necessary, or right, or eligible, to move a limb in the case of simple fracture? what benefit can be proposed by it? what utility can be drawn from it? When a broken bone has been well set, and the limb well placed, what possible advantage can arise from moving it? surely none; but, on the contrary, pain and probable mischief. Is it not the one great intention, to procure unition? Can moving the limb every two or three days contribute to such intention? Must it not on the contrary obstruct and retard it? Is not perfect quietude as necessary toward the union of the bone, in a simple as in a compound fracture? It is true, that in the one there is a wound which requires to be dressed, and the motion of the limb may in general be attended with rather more pain than in the other: but does motion in the simple fracture give ease, or procure more expeditious union?

Every benefit then which can be supposed to be obtained from the use of the common bandage or roller, is equally attainable from the use of that which I have just mentioned, with one ad-

ditional, and, to the patient, most invaluable advantage; *viz.* that of never finding it necessary to have his leg or thigh once during the cure removed from the pillow on which it has been properly deposited. In short, to quit reasoning and speak to fact, it is the constant practice at St. Bartholomew's, and attended with all possible success. We always use the eighteen-tailed bandage; and never move the limb to renew or adjust it[1].

The parts of the general apparatus for a simple fracture, which come next in order, are the splints.

These are generally made of pasteboard, wood, or some resisting kind of stuff, and are ordered to be applied lengthways on the broken limb; in some cases three, in others four; for the more steady and quiet detention of the fracture.

That splints properly made and judiciously applied are very serviceable, is beyond all doubt; but their utility depends much on their size and the manner in which they are applied.

In general practice, they are made of such length, as not to reach either upward or downward, so far as the roller extends; not to comprehend either the upper or the lower joint of the broken bone, and to exceed the fracture either way not many inches. They do not, for example,

[1] See the different opinions of different French practitioners, with their reasons on this subject, in Du Verney, Traitè des Maladies des Os.

in the broken leg, comprehend either the joint of the knee, or the joint of the ancle, and act only on the fracture[m].

In this manner of application, and of this size, they are in fact neither more nor less than compresses, and compresses made of very bad materials. All the good that ever is, or that can be done by them, when of such length and so

[m] This is the old doctrine, and has been almost universally and constantly adhered to and followed. Our forefathers, finding that such splints as they used and applied in their manner excited pain and inflammation, did not use, but forbad them until after seven days were past, and the first inflammation, as they thought, was over.

After this, they put them on to strengthen the fracture, as they said, and therefore made them short for that purpose only, expressly cautioning us against the only method of applying hem (in the case of a broken leg), in which they can be really useful; *viz.* that in which they comprehend both the knee and ancle.

" Ferularum usus idem est ac pannorum ad fractum os con-
" tinendum, ut maneat immotum, etiamsi membrum univer-
" sum moveatur.

" Jubet Hippocrates leves esse ferulas et æquales et ad ex-
" trema resimas, &c.

" Sed et *breviores ferulas* esse præcipit *ipsa vinctura*, ne
" quando cutem proximam tentare valeant eminentem ple-
" rumque ob humores receptos, quos fasciæ exturbant. Id
" quoque cavere oportet, ne ad ossium eminentias, quales in
" ima tibia et sura sunt, ferulæ pertingant," &c. &c. &c.

ORIBASIUS *de Fracturis.*

" Sed hoc tempore (post septimum diem) vice plagularum
" oportet ferulas apponere.

" His utebatur Hippocrates demum post septimum diem;
" quia ante septimum magis urgebat intentio arcendæ inflam-
" mationis, quam intentio stabiliendi fracturam; post septi-
" mum autem contra accidit." FAB. ab AQUAPENDENTE.

applied, might certainly be done in a better manner by a more proper kind of compress; and every disadvantage, which a hard resisting compress, injudiciously applied, is capable of producing, is probable to result from them thus used.

The true and proper use of splints is, to preserve steadiness in the whole limb, without compressing the fracture at all. By the former they become very assistant to the curative intention; by the latter they are very capable of causing pain and other inconveniences; at the same time that they cannot, in the nature of things, contribute to the steadiness of the limb.

In order to be of any real use at all, splints should, in the case of a broken leg, reach above the knee and below the ancle; should be only two in number; and should be so guarded with tow, rag, or cotton, that they should press only on the joints, and not at all on the fracture.

By this they become really serviceable; but a short splint, which extends only a little above and a little below the fracture, and does not take in the two joints, is an absurdity; and, what is worse, it is a mischievous absurdity.

By pressing on both joints, they keep not only them, but the foot steady; by pressing on the fracture only, they cannot retain it in its place, if the foot be in the smallest degree displaced; but they may, and frequently do occasion mischief, by rudely pressing the parts covering the fracture against the edges and inequalities of it.

I suppose it will be said, that although short

splints do not of themselves sustain and keep steady the two joints, and consequently the limb, yet that purpose in the broken leg may be, and is, fulfilled by junks, fanons, and other contrivances. To which I answer, that then the short splints are in that case of no use at all, and had better be laid aside: they should be used for no other purpose, but that of keeping the limb steady; and, if they do not answer that end, they are an incumbrance, and multiply the articles in the apparatus for a fractured leg very unnecessarily.

In the case of a fractured os femoris, if the limb be laid in an extended posture, one splint should certainly reach from the hip to the outer ancle, and another (somewhat shorter) should extend from the groin to the inner ancle. In the case of a broken tibia and fibula, there never can be occasion for more than two splints, one of which should extend from above the knee to below the ancle on one side, and the other splint should do the same on the other side. The manner of applying them, if the limb be deposited in a state of flexion, will come under the next article.

This, and indeed the most essential article in the treatment of a fracture, is the position of the limb. Upon the judicious or injudicious, the proper or improper execution of this, depends the ease of the patient during his confinement, and the free use and natural appearance of his limb afterward.

If I meant to describe, or if I approved (pardon the phrase), the common method of placing the

broken leg and thigh in a straight manner, this would be the place to mention the many very ingenious contrivances and pieces of machinery, which practitioners, both ancient and modern, have invented for the purpose of keeping the whole limb straight and steady; that is, of keeping all the muscles surrounding the fractured bone constantly upon the stretch, and at the same time of preventing any inequality in the union of it, and any shortening of the limb, in consequence of such inequality.

But as it is my intention by these sheets to inculcate another, and as it appears to me a better disposition of the limb, in which such boxes, cradles, and pieces of machinery are not wanted, nor can be used, it is needless for me to say any thing about them.

According to this plan the fractured leg and thigh should be deposited on the pillow, in the very posture in which the extension was made, and the fracture set; that is, with the knee bent.

I have already been so explicit, or perhaps prolix, on the tense or lax state of the muscles, as depending on posture, under the head of extension, that I shall spare the reader, as well as myself, a good deal of trouble by referring back to that article. All that is there urged, or that can be urged for making the extension, that is, for setting a fracture in such disposition of a limb or its muscles, is equally powerful and conclusive with regard to the manner of depositing and leaving it after it has been set. Whatever renders reduction and coaptation easy, must as

necessarily maintain ease during the confinement, preserve rectitude of figure, and prevent displacement. The same principle must act on both occasions; and whether the doctrine be right or wrong, considered by itself, it must be equally so in both circumstances; that is, in the manner of setting a fracture, and in the manner of depositing the limb afterward[n]. In the case of the fractured os humeri, the only position in which it can with any tolerable convenience to the patient be placed, is, with the elbow bent, that very position which necessarily relaxes and removes all the resistance of the surrounding muscles. Daily experience evinces the utility of this, by our very seldom meeting with lameness or deformity after it, notwithstanding the prevailing apprehension of exuberant callus.

The deformity frequently consequent to the fracture of the bones of the cubit, particularly that of the radius only, will generally, if not always, be found to be in proportion as the muscles concerned in the pronation and supination of the hand happen to be put more or less into a state of action, or tension, by the position of the limb.

In the thigh, the case is still more obvious, as the muscles are still more numerous and stronger.

[n] It has been said, that the straight position of a limb, by putting the muscles on the stretch, induces them to contribute to the security of the fracture against displacement. If this be the case in general, how happens it that those bones are always found most liable to be displaced when broken, and to be most difficult to keep in their proper place, which are surrounded by the most, and by the strongest muscles?

The straight posture puts the majority of them into action, by which action that part of the broken bone, which is next to the knee, is pulled upward, and by passing more or less underneath that part which is next to the hip, makes an inequality or rising in the broken part, and produces a shortness of the limb.

In the fracture of both bones of the leg, the case is still the same; a straight position puts the muscles upon endeavouring to act; a moderate flexion of the knee relaxes them, and takes off such propensity*.

The disposition, therefore, of the broken cubit ought to be that which, by putting the hand into a middle state between pronation and supination, and by bending the fingers moderately, keeps the radius superior to the ulna; or in other words, the palm of the hand should be applied to the breast, the thumb should be superior, the little finger inferior; and the hand should be kept in this posture constantly by means of two splints, which should reach from the joint of the elbow on each side, and should be extended below the fingers; or the same purpose may be still better answered by a simple, neat contrivance of the very ingenious Mr. Gooch of Norfolk; of which he has given a draft, and which is preferable to a common splint,

* In proportion as the fracture shall happen to be more or less oblique, the truth of this doctrine will, upon experiment, be found to be more or less apparent, as well as useful.

by its admitting the fingers to be more easily bent.

The position of the fractured os femoris should be on its outside, resting on the great trochanter; the patient's whole body should be inclined to the same side; the knee should be in a middle state, between perfect flexion and extension, or half bent; the leg and foot lying on their outside also, should be well supported by smooth pillows, and should be rather higher in their level than the thigh; one very broad splint of deal, hollowed out, and well covered with wool[p], rag, or tow, should be placed under

[p] If the pillow on which the broken thigh is placed be not too thick, the splint may with equal advantage be placed underneath such pillow, and in many cases this will be found to be the best manner of using it *.

* Of late years Mr. Pott was not partial to the use of pillows; and I have often heard him object to their being placed between the splint and the limb; indeed, in general, our intentions are better effected without any. I would take the liberty to recommend, in fractures of the leg or thigh, so soon as the bones are set, and the limb placed in a proper position on a splint, that it be gently laid on the bed, previously made firm, smooth, and level. In this manner it lies on a foundation to be depended on: if a pillow be placed under a fractured leg, it elevates it above the level of the body, and the thigh remains unsupported. If another be placed under the thigh, though it may in some measure obviate this inconvenience, it is very liable to be displaced. In general, the elevation of the leg, so far from being necessary, is prejudicial; the limb will lie with much more ease and security when on a level with the pelvis: the bed therefore cannot be made too flat. If it be thought necessary to raise the limb higher, in order to serve any particular purpose, pillows or double blan-

the thigh, from above the trochanter, quite below the knee; and another, somewhat shorter, should extend from the groin below the knee on the inside, or rather in this posture on the upper side; the bandage should be of the eighteen-tail kind; and when the bone has been set, and the thigh well placed on the pillow, it should not, without necessity (which necessity in this method will seldom occur), be ever moved from it again until the fracture is united; and this union will always be accomplished in more or less time, in proportion as the limb shall have been more or less disturbed.

In the fracture of the fibula only, the position is not of much consequence; because, by the tibia remaining entire, the figure of the leg is preserved, and extension quite unnecessary; but still, even here, the laying the leg on its side, instead of on the calf, is attended with one very good consequence; *viz.* that the confinement of the knee, in a moderately bent position, does not render it so incapable of flexion and use afterward, as the straight or extended position of it does; and consequently that the patient

kets may be very conveniently placed under the bed: by these means a broad steady basis will still be preserved for the support of the fractured limb. With regard to applying pillows between the limb and the splint, I must observe, that they cannot be thus used to advantage, as they take from the proper stability and pressure of the splint, and give the fractured ends of the bones too much play. The nearer and closer the splints are to the limb, the better, provided they are prevented from galling by the interposition of some soft substance, such as tow or rag. E.

will be much sooner able to walk, whose leg has been kept in the former posture, than he whose leg has been confined in the latter.

In the fracture of both tibia and fibula, the knee should be moderately bent, the thigh, body, and leg, in the same position as in the broken thigh. If common splints be used, one should be placed underneath the leg, extending from above the knee to below the ancle, the foot being properly supported by pillows, bolsters, &c.; and another splint of the same length should be placed on the upper side, comprehending both joints in the same manner; which disposition of splints ought always to be observed, as to their length, if the leg be laid extended in the common way, only changing the nominal position of them, as the posture of the leg is changed, and calling what is inferior in one case, exterior in the other; and what is superior in one, in the other inferior [q].

If Mr. Sharpe's splints be made use of, there is in one of them a provision for the more easy support of the foot and ancle, by

[q] All writers on this subject agree in giving us cautions about defending the heel, and filling up the hollow from it to the calf of the leg; and this they do on account of the pain, excoriation, and even ulceration, which sometimes attend the straight position, with the limb resting on the heel.

Many of them have also taken notice of an accident sometimes attendant on a broken leg, but which really ought to be set to the account of the posture in which such leg is placed, more than to that of the fracture: I mean the shrinking or wasting of the calf.

an excavation in, and a prolongation of the lower or fibular splint, for the purpose of keeping the foot steady.

I hope that I have expressed my meaning clearly; I should be very sorry to be mistaken, because it appears to me to be a matter of some consequence; and if what I have said be intelligible, the reader will understand from thence, that I mean to signify that (in my opinion) extension will in general be made with more facility, and coaptation more happily executed; that a patient will suffer a great deal less pain during these operations, as well as during the necessary confinement for a broken leg or thigh; and that both patient and surgeon will be less likely to be disappointed in their intention and wish; that is, that the former will be less liable to lameness or deformity, when a fractured thigh or leg has been treated in the way I have described, than in the common one.

The resistance necessarily made by the muscles, joined to the great instability of parts in every species of fractured leg or thigh, except in the few where the bones are broken transversely, has constantly exercised the invention and ingenuity of practitioners, in devising means to prevent inequality in the callus, as it is called, and shortness and deformity of the limb. Our books abound with draughts and descriptions of machines for this purpose; ligatures, pullies, leaden weights, and fracture-boxes, so contruc ted as to overcome and constantly to resist that action of the muscles surrounding the broken

bone, that natural tendency in them to contract, which the extended position of the limb necessarily induces. Every body who has been conversant with matters of this sort knows, that even the best of these various contrivances often prove successless; and every one who will reflect ever so little may see why they must be so. That they do prove ineffectual, the number of deformed legs and shortened thighs, which are daily met with, evinces; and that they must frequently prove so will be obvious to every one, who will consider that the effect can last no longer than the cause is continued, unless there happens to be some very favourable circumstance in the fracture itself. What I mean is this, when the reduction of the fracture is set about, the limb is put into such position, that the surrounding muscles resist the extending force very considerably, and this in proportion to their strength and number; that force is continued and increased till the muscles give way; and the resistance being overcome, an opportunity is thereby obtained of placing the ends of the fracture in as apt position with regard to each other as the nature of it will admit. If the fracture be of the transverse kind; that is, if the ends of the broken bone be large, and afford a good deal of space for contact with each other, such apposition will contribute a good deal to the keeping the limb steady, and the fracture even; but if the fracture be of the oblique kind, if there be several loose pieces, and consequently neither large contact nor sta-

bility from the apposition, or if due extension has not been made, or could not, or if the ends of the bones have not been judiciously and properly set, the muscles will act as soon as the extension is relaxed, the fracture will be more or less displaced, according to the nature of it, the limb will be shortened, the time of union will be prolonged, and the place of it (the callus, as it is called) will be in proportion more or less unequal.

I take it for granted that it will be asked, Have not our ancestors in all times happily redressed fractured legs and thighs, by the method which they have delivered down to us, and which in the preceding pages I have taken the liberty to object to? Have not such limbs frequently been rendered as straight, as useful, and as little deformed as possible? I answer, most certainly, yes; it is an undoubted truth, and cannot be denied. But in my turn, let me be permitted to ask, Whether in the same method great and even unsurmountable difficulty is not frequently met with? Whether in many cases the act of setting, as it is called, is not excessively painful at the time, and productive of inflammation and other disagreeable symptoms afterward? and whether, in spite of all care, of every contrivance, of every species of machinery which has yet been used, broken thighs and legs are not often, very often, left deformed, crooked, and shortened, and that merely from the action of the muscles, and the obliquity or shattered state of the fracture?

The fact is notorious, and the sole question is, Whether or no a different disposition of the parts preventing such action and such resistance, will in many instances prevent these evils? To which, from repeated experience, I answer, Yes. If this should be found to be the case in general, of which I make no doubt that it is, if by this method, many of such unfortunate cases, as in the common method of treatment disappoint both patient and surgeon, should be found in general to succeed so well as to satisfy both, it will prove all I wish it should prove. Superior utility and more frequent success are all I contend for.

Many people did very well under amputation before the double incision was practised; but is the double incision therefore no improvement? The operation for the bubonocele may be performed with that clumsy instrument the probe scissors, but is the history therefore not preferable? A surgeon may cut off some ounces, or even pounds of flesh from a patient's backside, in order to cure a sinus, but is the cure by the simple division of that sinus therefore not easier or more expeditious? Neither of these can (I think) be proved, unless it can at the same time be proved, that pain is no evil, confinement not at all irksome, and that deformity and elegance of figure are synonymous terms.

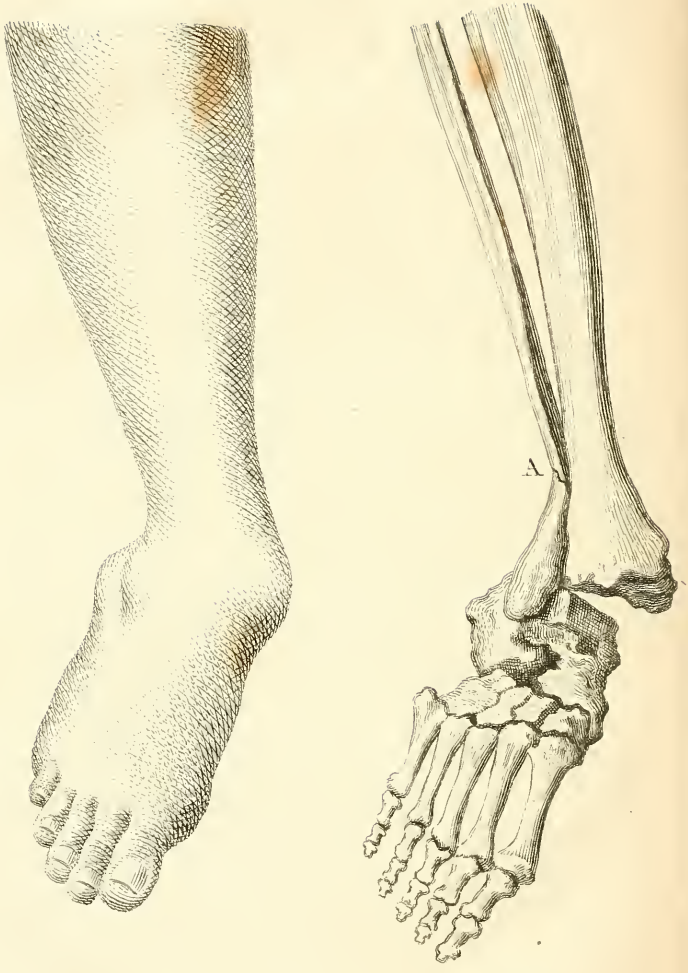
Let not the reader fancy that I would dare to amuse him with speculation, or merely specious reasoning on a subject like this. What I have said is from experience, repeated experience

both of myself and of others, for a considerable length of time past, and on a great variety of subjects; from an experience which has perfectly satisfied me, and I think will every man who will make the trial fairly and candidly.—I do not pretend to say, that by these means every kind of broken bone will infallibly and certainly be brought to lie smooth, even, and of proper length; if I did, they who are versed in these things would know that I said too much: but I will say (what is sufficient for my purpose), that it will not only succeed in all those, in which the old method can ever be successful; but also in the majority of those in which it is not, nor in the nature of things can. In those fortunate cases, in which either method will do, the old one is fatiguing, inconvenient, and even sometimes offensive, from the supine and confined posture of the patient; whereas, that which is here proposed, gives the patient much greater liberty of motion for every purpose either of choice or necessity; and in many of those cases, wherein the old method proves most frequently so far successless, as to leave the limb short, lame, or deformed, I say, in most of these, the proposed method will not be attended with these inconveniences.

I have already said, that in most cases of broken thigh or leg, the method just described will be attended with great success: but there is one particular case in which its utility is still more conspicuous; a case which, according to the general manner of treating it, gives infinite

pain and trouble both to the patient and surgeon, and very frequently ends in the lameness and disappointment of the former, and the disgrace and concern of the latter—I mean the fracture of the fibula attended with a dislocation of the tibia.

Whoever will take a view of the leg of a skeleton, will see that although the fibula be a very small and slender bone, and very inconsiderable in strength, when compared with the tibia, yet the support of the lower joint of that limb (the ancle), depends so much on this slender bone, that without it the body would not be upheld, nor locomotion performed, without hazard of dislocation every moment. The lower extremity of this bone, which descends considerably below that end of the tibia, is by strong and inelastic ligaments firmly connected with the last-named bone, and with the astragalus, or that bone of the tarsus which is principally concerned in forming the joint of the ancle. This lower extremity of the fibula has, in its posterior part, a superficial sulcus for the lodgment and passage of the tendons of the peronei muscles, which are here tied down by strong ligamentous capsulæ, and have their action so determined from this point or angle, that the smallest degree of variation from it, in consequence of external force, must necessarily have considerable effect on the motions they are designed to execute, and consequently distort the foot. Let it also be considered, that upon the due and natural state of the joint of the ancle,


A

that is, upon the exact and proper disposition of the tibia and fibula, both with regard to each other and to the astragalus, depend the just disposition and proper action of several other muscles of the foot and toes; such as the gastrocnemii, the tibialis anticus and posticus, the flexor pollicis longus, and the flexor digitorum pedis longus, as must appear demonstrably to any man who will first dissect, and then attentively consider these parts.

If the tibia and fibula be both broken, they are both generally displaced in such manner, that the inferior extremity, or that connected with the foot, is drawn under that part of the fractured bone which is connected with the knee; making by this means a deformed, unequal tumefaction in the fractured part, and rendering the broken limb shorter than it ought to be, or than its fellow. And this is generally the case, let the fracture be in what part of the leg it may.

If the tibia only be broken, and no act of violence, indiscretion, or inadvertence be committed, either on the part of the patient or of those who conduct him, the limb most commonly preserves its figure and length; the same thing generally happens if the fibula only be broken, in all that part of it which is superior to letter *A* in the annexed figure, or in any part of it between its upper extremity, and within two or three inches of its lower one.

I have already said, and it will obviously appear to every one who examines it, that the sup-

port of the body, and the due and proper use and execution of the office of the joint of the ancle, depend almost entirely on the perpendicular bearing of the tibia upon the astragalus, and on its firm connexion with the fibula. If either of these be perverted or prevented, so that the former bone is forced from its just and perpendicular position on the astragalus; or if it be separated by violence from its connexion with the latter, the joint of the ancle will suffer a partial dislocation internally[r]; which partial dislocation cannot happen without not only a considerable extension, or perhaps laceration of the bursal ligament of the joint, which is lax and weak, but a laceration of those strong tendinous ligaments, which connect the lower end of the tibia with the astragalus and os calcis, and which constitute in great measure the ligamentous strength of the joint of the ancle.

This is the case, when, by leaping or jumping, the fibula breaks in the weak part already mentioned; that is, within two or three inches of its lower extremity. When this happens, the inferior fractured end of the fibula falls inward toward the tibia, that extremity of the bone which forms the outer ancle is turned somewhat outward and upward, and the tibia having lost its proper support, and not being of itself capable of steadily preserving its true perpendicular bearing, is forced off from the astragalus inwards, by which means the weak bursal, or common ligament of

[r] See the figure at the preceding page.

the joint, is violently stretched, if not torn, and the strong ones, which fasten the tibia to the astragalus and os calcis, are always lacerated; thus producing at the same time a perfect fracture and a partial dislocation, to which is sometimes added a wound in the integuments, made by the bone at the inner ancle. By this means and indeed as a necessary consequence, all the tendons which pass behind or under, or are attached to the extremities of the tibia and fibula, or os calcis, have their natural direction and disposition so altered, that instead of performing their appointed actions, they all contribute to the distortion of the foot, and that by turning it outward and upward.

When this accident is accompanied, as it sometimes is, with a wound of the integuments of the inner ancle, and that made by the protrusion of the bone, it not infrequently ends in a fatal gangrene, unless prevented by timely amputation, though I have several times seen it do very well without. But in its most simple state, unaccompanied with any wound, it is extremely troublesome to put to rights, still more so to keep it in order, and unless managed with address and skill, is very frequently productive both of lameness and deformity ever after.

After what had been said, a further explanation why this is so, is unnecessary. Whoever will take even a cursory view of the disposition of the parts, will see that it must be so. By the fracture of the fibula, the dilatation of the bursal ligament of the joint, and the rupture of those

which should tie the end of the tibia firmly to the astragalus and os calcis, the perpendicular bearing of the tibia on the astragalus is lost, and the foot becomes distorted; by this distortion, the direction and action of all the muscles already recited are so altered, that it becomes (in the usual way of treating this case) a difficult matter to reduce the joint, and, the support of the fibula being gone, a more difficult one to keep it in its place after reduction. If it be attempted with compress and strict bandage, the consequence often is a very troublesome, as well as painful ulceration of the inner ancle, which very ulceration becomes itself a reason why such kind of pressure and bandage can be no longer continued; and if the bone be not kept in its place, the lameness and deformity are such, as to be very fatiguing to the patient, and to oblige him to wear a shoe with an iron, or a laced buskin, or something of that sort, for a great while, or perhaps for life.

All this trouble, pain, difficulty, and inconvenience, are occasioned by putting and keeping the limb in such position as necessarily puts the muscles into action, or into a state of resistance, which in this case is the same. This occasions the difficulty in reduction, and the difficulty in keeping it reduced; this distorts the foot, and by pulling it outward and upward makes that deformity which always accompanies such accident: but if the position of the limb be changed, if by laying it on its outside, with the knee moderately bent, the muscles forming the calf of the leg, and

those which pass behind the fibula and under the os calcis, are all put into a state of relaxation and non-resistance, all this difficulty and trouble do in general vanish immediately; the foot may easily be placed right, the joint reduced, and by maintaining the same disposition of the limb, every thing will in general succeed very happily, as I have many times experienced.

Two kinds of fracture there are, and only two that I can recollect (relative to the limbs) which do not admit of the bent position of the joints; I mean that of the processus olecranon at the elbow, and that of the patella: in these a straight position of the arm and leg is necessary; in the former to keep the fractured parts in contact till they are united; in the latter, to bring them as near to each other as may best serve the purpose of walking afterward[6].

[6] Although a straight position of the limb is necessary for the broken patella, yet this very position becomes so upon the same principle, as renders the bent posture most advantageous in the broken tibia and femur; *viz.* the relaxation of the muscles and tendons attached to the fractured bone.

Whoever will for a moment attend to the disposition of the pieces in a patella, which has been broken transversely, will see how little necessary or useful the many contrivances of bandages, straps, compresses, buckles, buttons, &c. to be found in writers are, especially all that part of them which are applied to the inferior fragment.

By the action of the united tendons of the extensores muscles of the leg, the superior fragment is pulled upward and separated from the inferior, but the latter remains nearly, if not absolutely, where it was before the accident: there is nothing to act upon it, and therefore it cannot, nor does it move.

With regard to the fracture of the patella, an opinion has long and generally prevailed, which seems to me to have no foundation in truth, or (when duly considered) even in probability; it is, that the great degree of stiffness in the joint of the knee, which is sometimes found to be the consequence of this kind of fracture, is owing to, or produced by, a quantity of callus falling into it from the edges of the broken bone; and that the nearer the broken pieces are brought to each other, the more likely such consequence is.

Every part of this doctrine seems equally absurd. In the first place, the fractured bone is by no means capable of supplying such a quantity of callus as to produce this end, unless it may be supposed to run from it as solder from a plumber's ladle; in the second place, if this was the case, the most likely, and indeed the only probable way of preventing the deposition of such juice, must be by bringing the broken pieces into close contact; and in the third place, there is no authority, from the appearance of such joints after death (at least as far as my experience goes), to suppose this to be the case, or to countenance such opinion. The cause therefore of this rigidity, which is now and then found to attend the broken patella, must be sought for

The extension of the leg puts the muscles attached to the upper part of the broken bone into a state of relaxation, and prevents their acting; and though a small compress just above this piece, with a moderate bandage, may be useful toward retaining it, yet it is the position of the leg which must keep the broken piece down, and effect the cure.

elsewhere; *viz.* in the long rest and confinement of the joint as a means used by many to procure exact union; in mischief done to the ligament, which is formed by the united tendons of the four extensor muscles of the leg, at the time of and by the fracture; and in the nature of the fracture itself, that is, the manner in which the bone shall happen to be broken.

But, be all this as it may, the fact undoubtedly is, that they walk best after such accident, whose patella has been broken transversely, and that into two nearly equal fragments; whose confinement to the bed has been short, that is, no longer than while the inflammation lasted; whose knee, after such period, has been daily and moderately moved; and in whom the broken pieces are not brought into exact contact, but lie at some small distance from each other[t].

[t] It has been suggested to me that there is an obscurity in this passage, and that Mr. Pott's doctrine with regard to the fractured patella is not clearly understood; in consequence of which, his authority has been quoted for giving motion to the joint soon after the accident, and for keeping the divided parts of the patella separate from each other to a great distance. Whoever has conceived this to be Mr. Pott's meaning, has certainly been mistaken, as his practice differed very materially from it. As the passage mentions, that the confinement need not be longer than while the inflammation lasts, the time which is proposed to keep the limb quiet after the accident is perhaps not sufficiently definite, nor expressed with Mr. Pott's usual precision, as frequently only a small degree of inflammation is excited, particularly in those cases where the knee does not reach the ground, which often happens. Every one conversant in business must have seen instances of this fact, where the bone is torn asunder by the mere force of the extensor

I cannot take leave of this subject of simple fractures, without mentioning a circumstance

muscles: it has happened to a person standing firm, and reaching for something on a high shelf, by which posture those muscles are put into strong action, as must be evident to any one who will make the experiment; in these cases there is no external injury, and frequently little inflammation follows the fracture. Are we then immediately to move the limb, and keep the parts of the bone separate? Certainly not. Mr. Pott only meant to caution against too strict and too long confinement; and his constant practice was, to lay the leg in a perfectly straight posture, to elevate the heel, and, by a moderte bandage and compress, to bring down the superior portion of the patella. In this position he usually kept it near three weeks, after which time he allowed of a small degree of motion, which he recommended to be gradually increased.

In fractures of this bone, it is not always in our power to bring the divided parts into contact, consequently there will be a space, which will be supplied with ligamentous substance; as the osseous fibres are here sparingly produced. In proportion to the distance between the two parts of the bone, the chord or tendon on which the extensor muscles act, must be longer than when the bone is in its perfect state, and the muscular power must be proportionally lessened. This should certainly be avoided as much as possible, and can only be avoided by bringing the parts as nearly as may be into contact. Unless this union be in some degree preserved, the muscles will have too little power on the ligament which is inserted in the tibia, although they contract to the greatest possible degree; consequently the person whose patella is much elongated, is obliged to depend principally on the flexor muscles of the thigh and the weight of the leg itself, to bring it forward in progression; which is performed in a most aukward manner, and is found particularly inconvenient in going up and down stairs. If both patellæ have been broken, and are in the same lengthened state, the person is generally obliged to ascend and descend sideways. E.

relative to them, which although, when rightly understood, is of little or no importance, yet, by being misunderstood, becomes frequently of considerable consequence.

I mean, the use of the term, *rising end of a broken bone.*

By the expression, any one unacquainted with these things would be inclined to think, that the prominent part of a broken bone rose, or was elevated from its natural place; and became by such rising superior to the other part or extremity of the fracture. This would certainly be the idea of an ignorant person, and as such would be of little consequence; but by the practice of many, who call themselves surgeons, it is as certainly their idea also, and this renders it a matter of great consequence. Many instances are producible, in which our conduct is in great measure regulated by the language which we use. Having no ideas annexed to our words, leads us into absurdity and unintelligibility; but false ones influence us still more, and frequently produce very material errors.

The fistula lachrymalis, the fistula in perineo, and that in ano, are glaring proofs of this; and my present subject is full as much so: for upon the erroneous idea annexed to the term *rising end*, stands all the absurd practice of compress, bolster, and strict bandage in the cases of simple fracture [u].

[u] I was some few years ago carried by a surgeon, since dead, to see a contrivance of his own to keep down the rising end of a broken tibia. It was somewhat upon the principle

The truth is, that there is really no *rising end* to a broken bone; I mean, when applied, as the term usually is, to the leg, thigh, and clavicle. There is indeed a superior or prominent end or part, and an inferior or depressed one; but the former of these is in its proper place, from which it cannot by art be moved; and the latter, which is not in its proper place, is very capable by art of being put into it.

Perhaps this may to some appear a mere play of words, a nominal distinction, without real difference; but when the influence which a right or wrong idea of this produces on practice is attended to, the consequence will be obvious and serious.

When a collar-bone, os femoris, or tibia and fibula are broken, by the action of the muscles, by the motions of the patient, and by the mere weight of the inferior part of the arm, thigh, or leg, the fractured ends of such bones are displaced, and always displaced in such manner, that the inequality occasioned necessarily by such displacement, proceeds from the inferior end of the fractured bone being retracted or drawn under the superior: this produces a tumefaction or unequal rising; and the upper extremity of the fracture is therefore called the rising end of it. Now the man who regards this rising end as that

of Petit's tourniquet, and calculated to act by compression. I told him my opinion freely, but the inventor was wedded to his invention; and the first simple fracture he applied it to he thereby converted into a compound one, by pressing the bone through the skin.

part of the fracture which has by such rising got out of its place, and not as having accidentally become the prominent part merely by the insinuation or retraction of the other part underneath it, will go to work with bolster, compress, and bandage, in order to bring and keep such end down; by which means he will give his patient considerable pain, and, while he depends on such means alone, will most certainly be frustrated in his intention and expectation, the means not being adequate to the proposed end. But the man who looks on this in the true light, that is, who looks on the superior part as being in its proper place, and the inferior as being displaced by the weight of the limb and the action of the muscles, will know, that by the mere position of such limb, he shall be able to remedy all the inconvenience and deformity, as far as they are by art capable of remedy, without the parade or the fatigue of useless apparatus.

He will, for example, know that the prominent part of a broken clavicle, that part of it which is next to the sternum, is just where it should be; and that the inferior part, that which is connected with the scapula, is out of its place, by being drawn down by the weight of the arm; and therefore, instead of loading, as is usual, the prominent part with quantities of compress, which never can do any service, he, by a proper elevation of the arm, will bring the lower end upward into contact with the other; and thereby, with very little trouble, easily accomplish what

he never can do in any other manner, however operose.

The same thing will happen, from the same principles, in the leg and thigh: a prominence, or a rising end, there always will be; but that rising end is never to be brought down by any pressure from compress or bandage: the fallen or inferior one must always be brought up to it by the proper position of the rest of the limb: this will always remove the inequality as far as it is removeable, and nothing else can[x].

[x] In a professed regular treatise on this subject, it would be right to take notice of what may be called the infortunia or accidental evils, which sometimes accompany even simple fractures; such are, disease arising from injury done to the medullary membrane, within the bones, in bad habits; hæmorrhage, or a species of spurious aneurism, from a wound of the interosseal artery, between the tibia and fibula, or of either of the carpal arteries; mischief from the fracture becoming accidentally the seat of the crisis of a fever; deficiency of callus, or the accident of the broken bone not uniting; the fractured limb becoming the seat of an erysipelas, terminating in a slough of the common membrane and periosteum; the gelatinous juice or callus, which should unite the fracture, being in so morbid a state as to produce a kind of caries with exostosis, instead of doing its proper duty, &c. Of all these there are examples, but they do not come within the plan which I prescribed to myself when I began these papers.

*** Mr. Pott might undoubtedly have been more diffuse, and have considerably dilated on his subject, if he had taken into consideration the various incidents which he has enumerated in the preceding note; and which are sometimes the consequences of fractured bones: but though (as he observes) this may not be deemed a professed regular treatise, he has certainly undervalued it, when he entitled it "A few general Remarks on Fractures and Dislocations," as the reader must have observed that it abounds in observations and rules of great consequence on this very important subject. And, indeed, it has been the principal cause of introducing a new mode of treating fractures, which is now almost universally approved and adopted. The idea of relaxing the muscles, in order more easily to set a broken or dislocated limb, is of infinite importance; and was certainly not sufficiently attended to before this treatise made its appearance.

If it were necessary to add any thing to the advantages which Mr. Pott has mentioned arising from the relaxed position in fractures, it might be observed, that in this situation patients very rarely suffer from cramps and spasms, which are frequently attendant when the limb is laid straight, and are extremely painful and productive of mischief; and I might add, that people whose limbs have been fractured by a fall, a kick of a horse, or any other accident, are very subject to such agitation of mind that their sleep for many nights is unsound; they continually dream of what they have suffered, and they catch and spring with an imaginary attempt to save themselves. When the leg was laid in a line with the body, the jerk was infallibly communicated to the fractured part, which gave the patient excruciating pain, and destroyed his repose for the remainder of the night; and in the morning the tedious painful process of putting it to rights was necessarily renewed. The involuntary actions of coughing and sneezing had also the same mischievous effect; and whoever has seen fractured legs lying in the straight posture must be sensible

that these circumstances have frequently occurred. In the relaxed position the shock is lost in the bended joints of the hip and knee, and the limb is not obliged to move with the body. Yet, although I have reason to approve in general of Mr. Pott's plan, of placing fractured legs on the outside, on the fibula; we sometimes find cases which should form exceptions to this general rule, particularly in fractures of the leg, where the broken end of the superior part of the tibia projects forward. In that case we sometimes find it impracticable to keep the ends of the bone even, without placing it on the heel.

In compound fractures, also, we sometimes find great advantage in placing the leg on the calf and heel; for instance, where there is a deep wound leading down to the bone on the inside of the leg or ancle, if it lies on the outside it is evident that a cavity must be formed in which the matter will be retained, and which, being in continual contact with the bones, must create great mischief, as it can only be wiped away, and that very imperfectly, once or twice a-day, when the wound is dressed. In this case, sometimes by placing the leg on the heel, an effectual current may be given to the matter, so soon as it is formed; the good effect of which on the wound will soon be perceived. In short, in all those cases where there are wounds, in which a depending opening can be effected by the position on the heel, it is to be preferred.

Except in such and similar cases to those just mentioned, I am a strong advocate for placing *broken legs* on the outside.

But I must confess that I have long entertained doubts whether this ought to be considered the best position for broken thighs. From the large mass of strong muscles surrounding the bone, from there being only one point of solid contact and no other bone to assist in keeping it steady, the thigh-bone is the most difficult to be placed, and most easy to be displaced, of any in the human frame. From long experience, I am convinced that bending the thigh and laying it on the outside, will not insure a straight and even union; and I appeal to those who have seen many fractured thighs treated in this manner, if the broken ends of the bone do not frequently ride over each other, in consequence of

which the broken thigh is often made shorter than the other, and the foot in walking turns outward. These defects, if they are not very wrong, become palliated, and less discernible, from the person being accustomed to meet them, by lowering, as he walks, the pelvis on the defective side. But the fact is as I have stated, and has often raised in my mind great objections to placing fractured thighs on the outside. I conceive that the displacement of the bones in this case is often owing to the weight of the pelvis bearing down the superior part of the broken thigh into a depression in the bed; for if this should give way, and become hollow, the whole of the thigh, as far as the fractured part, will be carried down and sink into it, while the lower end of the bone and knee retaining the first position in which they were placed, an obtuse angle will be formed; as it is impossible to keep on bandages and splints so tight as to counteract a deviation from the right position, when effected by such powerful means. In this case, very able surgeons, to my knowledge, have been and may again be deceived; for if the bandage be undone, and the thigh viewed in this position, the outline of the upper part of the thigh down to the knee will be perfect, and it will appear straight: but there is often a protrusion of the upper end of the fracture internally, which is not visible, and which nothing but accurate examination with the fingers can, through that vast thickness of soft parts, discover. If it be not noticed in time (that is, very early after the accident, perhaps within a week or ten days, according to the uniting disposition, which varies in different subjects and from different causes), the discovery will be made too late; an adhesion will soon take place between the ends of the bones and the contiguous muscles; bony matter will soon be formed in the interspace; and it will not be in our power to remedy this effect: of course the leg and foot will in future turn outwards. These considerations have led me, contrary to my education, to prefer laying broken thighs in a line with the body, conceiving that in this situation the fracture is less liable to be displaced, and that any deviation from the straight line, whether above or below, or on either side, is more readily discernible and more easily rectified. I do not wish to insinuate that placing fractured

thighs in the straight position is a new idea—I know it has been, and is now, practised by many—I only mean to say, that, though I have long been accustomed to see them laid in a bent posture, for the reasons above given I prefer the other: at the same time, in case of laying fractures either of the leg or thigh in a straight position, we need not lose sight of Mr. Pott's first and great principle, the benefit and use of relaxing the muscles; and, by raising the thigh toward the body, supporting that with pillows, and bending the knee to a certain degree, the same end may be obtained.

There is one case where we can have no choice—I mean when both thighs are broken. Under these circumstances it is evident that the patient must lie on his back, and consequently the thighs must be in the straight position: when thus of necessity placed, they do well; and this is a strong argument in favour of the practice.

But if there be any doubt of superiority between the straight and bent position of fractured thighs, there is a new contrivance which I conceive must turn the scale in favour of the former, as, in that posture, the introduction of any kind of machine under the patient to relieve him from natural evacuations, and the efforts to raise and assist himself, which from an innate sense of cleanliness he would otherwise almost involuntarily make, are by that invention wholly avoided; and I am sure every gentleman of the faculty will agree with me, that those circumstances are very often the cause of disturbing and displacing fractured thigh-bones, in whatever situation they may be placed.

The contrivance consists in a double bed: the upper one has an opening in the sacking, in a suitable place, and of a proper size, to which a thin mattress, blanket, and sheet, are made to correspond, with a similar aperture: this, by a very simple piece of mechanism, may be elevated to a sufficient height for the nurse to introduce a proper receptacle between that and the fixed bed. The patient being relieved, the bed is gently let down again upon the under one, a thin cushion being placed on the under bed, to fill up the opening and make the upper bed level.

Such a machine has been long and much wanted on many occasions. Indeed it is surprising, that among so many

inventions to promote gratification and convenience, so little has been done for the accommodation of the bed-ridden, or persons who are unable, from various causes, to leave their beds. These unfortunate beings, in this age of ingenuity and science, are still left in the same state that they have been obliged to submit to for centuries past.

It is well known that the common method of refreshing beds under sick persons is by removing the patient to one side of the bed, while the other side is shaken up; after which he is again removed till the opposite side is made. This must be allowed to be only a sort of half-comfort; the bed can be but imperfectly made, and can have no opportunity of becoming cool; consequently the patient is again consigned to the annoyance of his own heat and perspiration; and in fractures, rheumatism, gout, and many other cases which might be mentioned, even this refreshment it is sometimes impossible to give. By this contrivance, the upper bed may be raised, and the under one completely made, as often as may be thought necessary or agreeable without disturbing or discomposing the patient.

If it be objected, that though the under bed may be made, the upper one cannot be changed, it may be answered, that the under one is of the most consequence, being the same feather-bed or mattresses the person is accustomed to lie on, while the upper one has only a thin mattress, blanket, and sheet; but by means of a bar which was added for this and other purposes, it will be found that the upper bed may also at any time be occasionally changed.

After many years experience of the distressful situation of persons who from various complaints could not be removed from their loathsome beds, but have been obliged to remain in them till the very bed and sacking have rotted under them—after having so often witnessed the difficulty, danger, and not unfrequently the injury, which is caused by forcing a bed-pan under a patient in cases of fractures, painful wounds, rheumatic or gouty affections, and many other instances which might be mentioned—after having seen many cases in which it was absolutely impossible to introduce it at all, or its more filthy substitute (a draw-sheet), when the nurse could use no other than the most disgusting and im-

perfect means of cleaning the patient;—it cannot be wondered at if I feel great pleasure in communicating a contrivance, which will gently raise the patient, permit the bed to be fresh made, and give him the exquisite delight of coolness and cleanliness.

It is then my opinion, that not only in fractures and dislocations of the lower limbs, both simple and compound, but in diseases of the knee, hip, and spine; in fevers, when from long continued and unvaried position, added to moisture and heat, excoriations and often extensive mortifications take place on the nates, hips, and lower part of the back; in fistulas in perineo; in the gout and rheumatism, in which the least motion is often torture; in the natural confluent small-pox; in child-bearing, particularly in those cases where puerperal inflammation or danger of flooding requires a strict horizontal posture; in cases of insanity, when coercion is necessary; in sickness, weakness from age, or any other infirmity, which prevents persons from leaving their beds or from moving or being moved in them, the double bed will be found of admirable use and assistance.

It was invented by Mr. Henry Earle at a very early age, and soon after the commencement of his professional studies. Independent of any partiality, which on that score I might conceive for the invention, it appeared to me, and indeed is allowed by every one who has seen it, so well calculated to be useful on a great variety of occasions, that I have been induced to treat on it more at large in a Letter*; from which this is an extract, and in which its many comforts and utilities are pointed out.

Representations of the bed will also there be found; and conceiving they would not be unacceptable or unuseful, I have inserted them in this work. E.

* Containing some 'Observations on Fractures of the Lower Limbs. To which is added, an Account of a Contrivance to administer Cleanliness and Comfort to the Bedridden, or Persons confined to Bed by Age, Accidents, Sickness, or any other Infirmity. With explanatory Plates. E.

PLATE I.

Represents the original bed at St. Bartholomew's hospital, 3 feet 6 inches wide by 6 feet 4 inches in length. This being made expressly for the purpose, the upper bed corresponds exactly, and fits in with the other; but being intended for public and constant use, it is heavier and stronger than is necessary for private families.

Fig. 1 *shows the upper bed lying on the under one.*

Fig. 2, *the upper bed raised to a convenient height.*

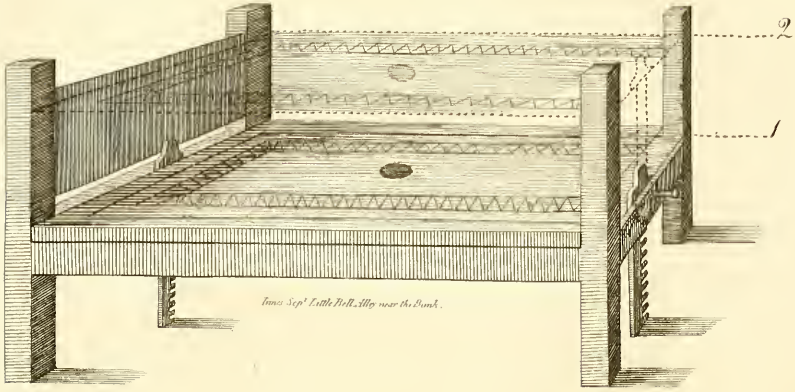
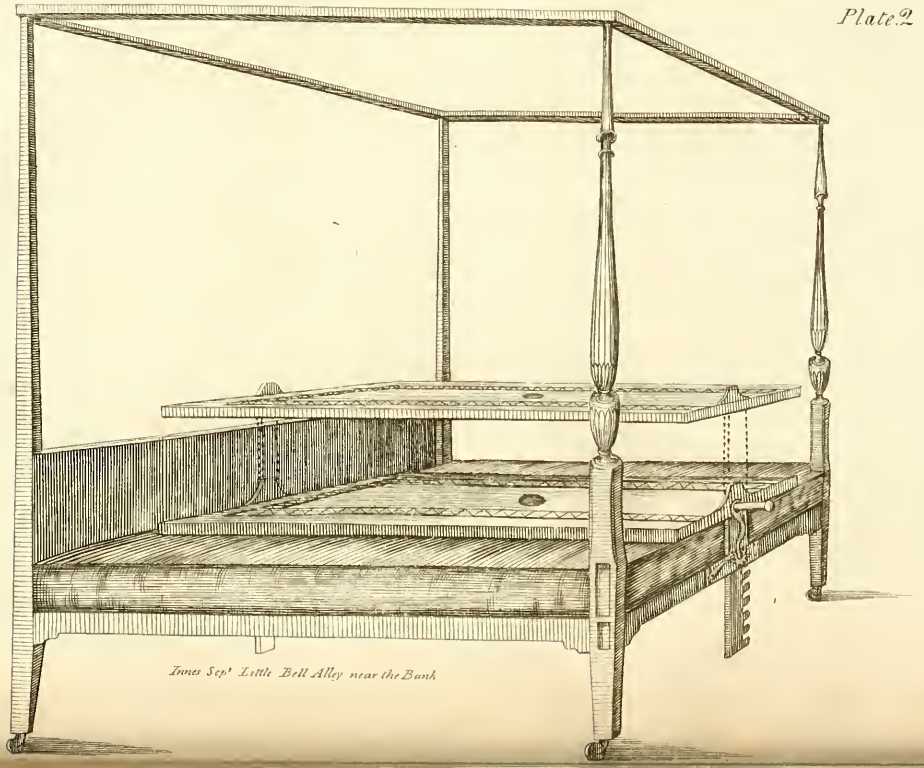

2
1
Jones Sept. Little Britain near the Bank.

PLATE II.

Shows the improved plan, in which the upper bed is made of sufficient width for one person, but it is intended to be placed on and fixed to any bed of any breadth.

The upper bed is seen lying on the lower bed,—and also as it appears when raised up.

Specimens of the bed may be seen at Mr. Oakley's, No. 8, Old Bond Street, who has undertaken the manufacture of them.



Innes Sep.t Little Bell Alley near the Bank

COMPOUND FRACTURES.

I USE the term compound fracture in the sense in which the English have always used it; that is, to imply a broken bone complicated with a wound.

In this kind of case the first object of consideration is, whether the preservation of the fractured limb can, with safety to the patient's life, be attempted; or, in other words, whether the probable chance of destruction, from the nature and circumstances of the accident, is not greater than it would be from the operation of amputation. Many things may occur to make this the case. The bone or bones being broken into many different pieces, and that for a considerable extent, as happens from broad wheels, or other heavy bodies of large surface, passing over, or falling on such limbs; the skin, muscles, tendons, &c. being so torn, lacerated, and destroyed, as to render gangrene and mortification the most probable and most immediate consequence; the extremities of the bones forming a joint being crushed, or as it were comminuted; and the ligaments connecting such bones being torn and spoiled; are, among others, sufficient reasons for proposing and for performing immediate amputation—reasons, which (notwithstanding any thing that may have been said to the contrary) long and reiterated experience has approved, and which are vindicable

upon every principle of humanity or chirurgic knowledge.

When a surgeon says, that a limb, which has just suffered a particular kind of compound fracture, ought rather to be immediately cut off, than that any attempt should be made for its preservation, he does not mean, by so saying, that it is absolutely impossible for such limb to be preserved at all events; he is not to be supposed to mean so much in general, though sometimes even that will be obvious; all that he can truly and justly mean is, that from the experience of all time it has been found, that the attempts to preserve limbs so circumstanced, have most frequently been frustrated by the death of the patients, in consequence of such injury; and that from the same experience it has been found, that the chance of death from amputation is by no means equal to that arising from such kind of fracture.

Every man knows, that apparently desperate cases are sometimes cured; and that limbs so shattered and wounded, as to render amputation the only *probable* means for the preservation of life, are now and then saved. This is an uncontroverted fact, but a fact which proves very little against the common opinion; because every man of experience also knows, that such escapes are very rare, much too rare to admit of being made precedents, and that the majority of such attempts fail[y].

[y] The baron Van Swieten, writing as many others have done,

This consideration relative to amputation is of the more importance, because it most frequently requires immediate determination; every minute of delay is, in many instances, to the patient's disadvantage; and a very short space of time indeed frequently makes all the difference between probable safety and fatality. If these cases in general would admit of deliberation for two or three days, and during that time such circumstances might be expected to arise, as ought necessarily to determine the surgeon in his conduct, without adding to the patient's hazard, the difference would be considerable;

that is, theoretically, on surgery, advises us, in the case of very bad compound fractures, which may most probably require amputation, to defer the operation, until we have tried the force of antiseptic fomentation and applications of like kind for two or three days; and this opinion and advice he builds, in some measure, on a remarkable success of La Motte, in a seemingly desperate case, of a man's leg mashed by the wheel of a heavy carriage.

That De La Motte's patient escaped, I make no doubt, because he has said so; but the surgeon showed much more rashness in attempting to save such a limb, than he would have done in the amputation of it: the operation would have been the more justifiable practice. With regard to the baron's advice, to stay two or three days, I take the liberty to add, that if you do that, stay several more; for at the end of that time (I mean two or three days) the patient will have very little chance indeed from the operation, much less than he would have had at the time of the accident.

I should be very sorry to be thought a patron or an adviser of rashness or cruelty; but in what I have here said, I believe I shall have every man in the profession, who has either true humanity or sound judgment founded on experience, on my side.

the former would not seem to be so precipitate in his determination, as he is frequently thought to be; and the latter, being more convinced of the necessity, would submit to it with less reluctance. But unhappily for both parties, this is seldom the case; and the first opportunity having been neglected or not embraced, we are very frequently denied another. Here therefore the whole exertion of a man's judgment is required, that he may neither rashly and unnecessarily deprive his patient of a limb, nor, through a false tenderness and timidity, suffer him to perish by endeavouring to preserve such limb. Some degree of address is also necessary upon such occasion, in order to convince the patient, that what seems to be determined upon hastily and with precipitation, will not safely admit of longer deliberation[z].

[z] That there are many cases which, from the extent of the laceration or from hæmorrhage, particularly in the leg, where the interosseal artery is torn by the ragged ends of the bones, and from other circumstances, it may be necessary to proceed to immediate amputation, must be allowed. But except in cases of extreme necessity, I must say, that sometimes, where the appearances scarcely furnish the glimmering of a hope of ultimately saving the limb, if the person appeared of a robust over-full habit, I should be inclined to wait, and to put off the operation until inflammation had taken place, and had subsided, and the patient had changed the high and boisterous state of health which he enjoyed at the time of meeting with the accident, for a quieter or more temperate circulation, when I conceive he would stand a better chance of recovering from the operation. I will here quote two similar accidents which terminated very differently:—

A stout lusty man, of a full habit of body, was employed

The limb being thought capable of preservation, the next consideration is the reduction of the fracture. The ease or difficulty attending this depends not only on the general nature of the case, but on the particular disposition of the bone with regard to the wound.

If the bone be not protruded forth, the trouble of reducing, and of placing the fracture in a good position, will be much less than if the case be otherwise; and in the case of protrusion or thrusting forth of the bone or bones, the difficulty is always in proportion to the comparative size of the wound, through which such bone has passed. In a compound fracture of the leg or thigh, it is always the upper part of the broken bone which is thrust forth. If the fracture be of

at the European Museum to hang some pictures. When on the ladder, he fell down with a heavy picture in his hands, by which his right foot and ancle were crushed, and dreadfully mangled. Though there was very little probability of the limb being saved, it was judged right to attempt it. I did not see him at first, but afterwards in consultation, when it appeared to me impossible to preserve the limb; but as his habit was apparently gross and full, it was agreed to wait some time longer. The quantity of discharge, low diet, and proper medicines lowered his constitution to a pitch much inferior to high health. He was now evidently losing ground; and as there remained not the most distant prospect of preserving the limb, it was amputated. Without any adverse circumstances, he got well, and remains a healthy man.

A gentleman, getting up on a library-ladder, fell down, and received a very bad compound fracture of the leg: it was judged, in consultation, impossible to save the limb, and immediate amputation took place. Inflammatory symptoms succeeded so high as to cause his death. F.

the transverse kind, and the wound large, a moderate degree of extension will in general easily reduce it; but if the fracture be oblique, and terminates as it often does, in a long sharp point, this point very often makes its way through a wound no larger than just to permit such extension. In this, the very placing the leg in a straight position, in order to make extension, obliges the wound or orifice to gird the bone tight, and makes all that part of it, which is out of such wound, press hard on the skin of the leg underneath it. In these circumstances, all attempts for reduction in this manner will be found to be impracticable; the more the leg is stretched out, the tighter the bone will be begirt by the wound, and the more it will press on the skin underneath.

Upon this occasion, it is not very unusual to have recourse to the saw, and by that means to remove a portion of the protruded bone.

I will not say that this is always or absolutely unnecessary or wrong, but it most certainly is frequently so. In some few instances, and in the case of extreme sharp-pointedness of the extremity of the bone, it may be, and undoubtedly is right: but in many instances, it is totally unnecessary.

The two most proper means of overcoming this difficulty are, change of posture of the limb, and enlargement of the wound. In many cases the former of these, under proper conduct, will be found fully sufficient; and where it fails, the

latter should always be made use of. Whoever will attend to the effect, which putting the leg or thigh (having a compound fracture and protruded bone) into a straight position always produces; that is, to the manner in which the wound in such position girds the bone, and to the increased difficulty of reduction thereby induced, and will then, by changing the posture of such limb from an extended one, to one moderately bent, observe the alteration thereby made, in both the just-mentioned circumstances, will be satisfied of the truth of what I have said, and of the much greater degree of ease and practicability of reduction in the bent, than in the extended position; that is, in the relaxed, than in the stretched state of the muscles. Reduction being found impracticable, either by extension or change of posture, the obvious and necessary remedy for this difficulty is enlargement of the wound. This to some practitioners, who have not seen much of this business, appears a disagreeable circumstance, and therefore they endeavour to avoid it; but their apprehensions are in general groundless and ill-founded. In enlarging the wound there is neither difficulty nor danger; it is the skin only which can require division; and in making such wound there can be no possible hazard. It is needless to say that the division should be such as to render reduction easy; or to remind the practitioner, that such enlarged opening may serve very good future purposes, by making way for the extrac-

tion of fragments, and the discharge of matter, sloughs, &c.

If the bone be broken into several pieces, and any of them be either totally separated, so as to lie loose in the wound, or if they be so loosened and detached as to render their union highly improbable, all such pieces ought to be taken away; but they should be removed with all possible gentleness, without pain, violence, or laceration, without the risk of hæmorrhage, and with as little poking into the wound as possible. If the extremities of the bone be broken into sharp points, which points wound and irritate the surrounding parts, they must be removed also. But the whole of this part of the treatment of a compound fracture should be executed with great caution; and the practitioner should remember, that if the parts surrounding the fracture be violated, that is, be torn, irritated, and so disturbed as to excite great pain, high inflammation, &c., it is exactly the same thing to the patient, and to the event of the case, whether such violence be the necessary consequence of the fracture, or of his unnecessary and aukward manner of poking into, and disturbing the wound. The great objects of fear and apprehension in a compound fracture (that is, in the first or early state of it), are, pain, irritation, and inflammation; these are to be avoided, prevented, and appeased by all possible means, let every thing else be as it may; and although certain things are always recited, as necessary to be

done, such as removal of fragments of bone, of foreign bodies, &c. &c. &c. yet it is always to be understood, that such acts may be performed without prejudicial or great violence, and without adding at all to the risk or hazard necessarily incurred by the disease.

Reduction of or setting a compound fracture is the same as in the simple; that is, the intention in both is the same, *viz.* by means of a proper degree of extension to obtain as apt a position of the ends of the fracture with regard to each other, as the nature of the case will admit, and thereby to produce as perfect and as speedy union as possible.

To repeat in this place what has already been said under the head of extension, would be tedious and unnecessary. If the arguments there used for making extension, with the limb so moderately bent as to relax the muscles, and take off their power of resistance, have any force at all, they must have much more when applied to the present case: if it be allowed to be found very painful to extend, or to put, or keep on the stretch, muscles which are not at all or but slightly wounded, and only liable in such extension to be pricked and irritated, it is self-evident that it must be much more so when the same parts are torn and wounded considerably; when the ends of the fractured bone have made their way quite through them, divided the skin, and laid all open to the access of the air.

Every consequence which does or may be

supposed to flow from wound, pain, or irritation, in consequence of violence, must necessarily be much greater, when a lacerated wound, and that made by the bone, is added to the fracture; not to mention the ills arising from extending or stretching out muscles already torn or half divided.

One moment's reflexion must be sufficient to convince any reasonable man: but experience is the only proper test of all these kinds of things. Let this method of treatment then be fairly and properly subjected to it; and if the great advantage of the one over the other does not appear, that is, if the less sensation of pain by the patient, and the more happy, more perfect, and more expeditious accomplishment of his purpose by the surgeon, do not determine greatly in favour of relaxed position, I am, and have, for a considerable length of time, been greatly mistaken.

The wound dilated (if necessary), loose pieces removed (if there were any), and the fracture reduced, and placed in the best possible position, the next thing to be done is to apply a dressing.

On this subject a great deal has been said by writers, particularly by such of them as have implicit faith in external applications; but, in order to be able to execute this part of the process properly, a man has only to ask himself, What are the intentions which, by any kind of dressing to a compound fracture, he means to aim at the accomplishment of? And a rational

answer to this will give him all that he can want to know.

The dressing necessary in a compound fracture is of two kinds; *viz.* that for the wound, and that for the limb. By the former, we mean to maintain a proper opening for the easy and free discharge of gleet, sloughs, matter, extraneous bodies, or fragments of bone, and this in such manner, and by such means, as shall give the least possible pain or fatigue, shall neither irritate by its qualities, nor oppress by its quantity, nor by any means contribute to the detention or lodgment of what ought to be discharged. By the latter, our aim should be the prevention or removal of inflammation, in order, if the habit be good, and all other circumstances fortunate, that the wound may be healed, by what the surgeons call the first intention, that is, without suppuration or abscess; or that not being practicable, that gangrene and mortification, or even very large suppuration may be prevented, and such a moderate and kindly degree of it established as may best serve the purpose of a cure. The first therefore, or the dressing for the wound, can consist of nothing better, or indeed so good, as soft dry lint, laid on so lightly as just to absorb the sanies, but neither to distend the wound, or be the smallest impediment or obstruction to the discharge of matter. This lint should be kept clear of the edges, and the whole of it should be covered with a pledget spread with a soft easy digestive. The times of dressing must be determined by the nature of the case: if the dis-

charge be small or moderate, once in twenty-four hours will be sufficient; but if it be large, more frequent dressing will be necessary, as well to prevent offence, as to remedy the inconveniences arising from a great discharge of an irritating sharp sanies.

The method of treating the limb, with a view to the prevention of such accidents and symptoms, as pain, inflammation, and laceration of parts, are likely to produce, is different with different practitioners; some using, from the very first, relaxing, greasy applications; others applying medicines of very different nature. Both these may be right conditionally, that is, according to different circumstances in the cases, but they cannot be equally so in the same circumstances.

Many practitioners are accustomed to envelope compound fractures in a soft, warm, relaxing cataplasm from the very first; whether the limb be in a tense swollen state, or not. This, if I may take the liberty of saying so, appears to me to be injudicious. When from neglect, from length of time passed without assistance, from misconduct or drunkenness in the patient, from aukwardness and unhandiness in the assistants, or from any other cause, a tension has taken possession of the limb, and it is become tumid, swollen, and painful, a warm cataplasm is certainly the best and most proper application that can be made, and that for very obvious reasons: the state of the parts under these circumstances is such, that immediate union is impossible, and nothing but a free and

plentiful suppuration can dissipate or remove impending mischief: every thing therefore which can tend toward relaxing the tense, swollen, and irritable state of the parts concerned, must necessarily be right; the one thing aimed at (plentiful suppuration), cannot be accomplished without it. But when the parts are not in this state, the intention seems to be very different. To relax swollen parts, and to appease pain and irritation by such relaxation, is one thing; to prevent inflammatory defluxion and tumefaction is certainly another; and they ought to be aimed at by very different means. In the former, a large suppuration is a necessary circumstance of relief, and the great means of cure; in the latter it is not, and a very moderate degree of it is all that is required. The warm cataplasm therefore, although it be the best application that can be made use of in the one case, is certainly not so proper in the other, as applications of a more discutient kind, such as mixtures of spirit. vini., vinegar and water, with crude sal ammoniac, spirit. Mindereri, acet. litharg., and medicines of this class, in whatever form the surgeon may choose. By these, in good habits, in fortunately-circumstanced cases, and with the assistance of what should never be neglected, I mean phlebotomy, and the general antiphlogistic regimen, inflammation may sometimes be kept off, and a cure accomplished, without large collections or discharges of matter, or that considerable degree of suppuration, which, though necessary in some cases, and almost unavoidable in others, are and

must be rather promoted and encouraged than retarded or prevented, by warm relaxing applications of the poultice kind[a].

[a] The principal cause of the inflammation, and the consequent bad symptoms which so frequently take place in compound fractures, appears to arise from the admission of air into the wound among the fractured bones; for we see that bones may be broken, ligaments and tendons may be bruised, torn, and wounded in any manner, and will unite, heal, and do well again, like other soft parts, provided no air gains admission: but if that is suffered to enter, it too often lights a fire which the art of surgery cannot quench. The stimulating influence of air on diseased cavities, is evident on many occasions. In the psoas abscess, matter may be formed and increased, so as to make a swelling of great magnitude; the patient will notwithstanding continue free from fever: but from the moment it is opened, and air admitted, a hectic fever takes place. Large extravasations of blood will remain in a quiet state for any length of time till they are re-absorbed, provided the skin remains whole; but if an opening is made, and air permitted to enter, a stimulus is applied, inflammation is excited, and a putrid slough of the sides of the cavity and its contents will generally be the consequence. Many other instances might be adduced, to prove that air, from whatever principle it acts, is certainly the great enemy in all these cases. Our first aim should therefore be to prevent it from entering, or, if it has entered, to exclude it; and this may frequently be accomplished by closing the wound as soon as possible, after the bones are placed in their proper situation, and by keeping it close with slips of sticking plaster; or in some cases sutures may be employed with advantage: it should then be covered with proper dressings, such as dry lint and sedative applications, avoiding every thing greasy. These first dressings should not be removed for many days, unless a collection of matter makes it necessary to change them. By these means the wounds in the soft parts may often be brought to heal by the first intention; and thus compound fractures, unattended with the usual long train of evils which Mr. Pott has so well described, will

Compound fractures in general require to be dressed every day; and the wounded parts not

frequently unite, and give no more trouble than simple fractures. The fortunate termination of the compound fracture in his own leg, was probably owing to the air being excluded: but this arose from the nature of the fracture, rather than from the manner in which it was treated, as the idea of preventing the first admission of air, in these cases, was not at that time attended to; though, while they were changing their dressings, by means of lamps and other contrivances, our forefathers endeavoured to correct its pernicious effects, which they ascribed to cold. In Mr. Pott's case, the fact was, that the bone had made its way through the skin at a distance from the fracture; so that, when it was returned into its place, the soft parts closed, and prevented the air from getting in; by which means the wound healed by the first intention.—I have now under my care a man who had a compound fracture of the leg. The wound was small, easily closed, and kept so by sticking plaster: as no bad symptoms followed, the first dressings were suffered to remain a fortnight, at the end of which time the wound was found healed, and the bones firm. Had it not been thus treated—on the contrary, had the dressings been removed, and the air suffered to enter—it is more than probable that the usual bad symptoms would have arisen; for the danger in compound fractures does not depend on the size of the wound. If air gets in, a small wound is equally bad as a large one, perhaps worse, by confining the matter after it is collected. I have mentioned this case as it occurs on the instant; but could adduce many more, in which equal success has attended this mode of practice.

The benefit arising from keeping out air, in these cases, was an observation I made when very young in the profession; and practice and experience have convinced me of the truth of it. I was sent for, many years ago, to a person who by a fall had a compound dislocation of the joint of the ancle. The skin was torn evenly, as if it had been divided with a knife: I could pass my finger into the cavity of the joint. Being aware of the horrid mischief which is usually produced by air being admitted

admitting the smallest degree of motion without great pain, perfect quietude becomes as necessary as frequent dressing.

The common bandage therefore (the roller) has always in this case been laid aside, and what is called the eighteen-tailed bandage substituted, very judiciously, in its place. Of this I have already spoken so largely, as to make repetition unnecessary.

Splints, that is, such short ones as are most commonly made use of in simple fractures, are by all forbid in the compound, and that for the same reason which ought to have prevented them

into these cavities, I was induced to try what would be the consequences of its entire exclusion: accordingly I sewed up the wound close, with a number of fine stitches, merely passing them through the edges of the skin, and then applied proper dressing and bandage. The wound, to my great surprise, healed by the first intention, without more inflammation than usually attends wounds of any other part. It may be proper to remark, that at the same time the man had received so violent a contusion on his back as to render his lower limbs paralytic. How far the want of nervous influence might have been the cause of the small degree of inflammation which took place, I cannot determine. It is a case which will not be easily parallelled, and no one can suppose that I mean to say that this plan will always succeed in compound fractures. However, the attempt is worth making in most cases, as no detriment can arise from it; and if we gain our point, it is a most important one to the patient, who avoids a tedious confinement of perhaps many months, not to mention all the concomitant evils. During this healing process we should endeavour to prevent inflammation from taking place by sedative applications, of which the saturnine are most efficacious; and by every means, both internal and external, which experience suggests. E.

from having ever been used in the former; *viz.* because the probable good to be derived from them can be but little; and the probable mischief is obvious and considerable.

But although short splints are for many reasons palpably improper, in both cases, yet those of proper length, those which reach from joint to joint, comprehend them both, and are applied on each side of the leg only, are very useful both in the simple and in the compound fracture; as they may, thus applied, be made to keep the limb more constantly steady and quiet, than it can be kept without them.

With regard to position of the limb, I have already been so explicit, when speaking of the simple fracture, that to say any thing more about it here would be an abuse of the reader's time and patience. The only, or the material difference between a simple and a compound fracture, as far as relates to this part of the treatment, is, that as the parts surrounding the broken bone in the latter are more injured, and consequently more liable to irritation, pain, inflammation, and all their consequences, therefore every method and means, by which the alleviation of such symptoms, and the prevention of such consequences can be obtained, is still more necessary and requisite. Among these the posture of the limb is so principal a circumstance, that without its concurrence every other will be fruitless. The points to be aimed at are, the even position of the broken parts of the bone, and such disposition of the muscles surrounding

them, as is most suitable to their wounded, lacerated state, as shall be least likely to irritate them, by keeping them on the stretch, or to produce high inflammation, and at best large suppuration. These, I say, are the ends to be pursued; and how much the position of the limb does, and must necessarily contribute to the advantage or disadvantage just recited, must be so obvious to any body capable of reflexion, that nothing more need be said about it.

At the beginning of these sheets, I have said, that it was not my intention to write a regular treatise, but only to throw out a few hints which I hoped might prove useful to such as have not yet received better information. The part of my subject at which I am now arrived, does not indeed admit of much more: a few general precepts are all which a writer can give: the particular method of conducting each particular case must be determined by the nature of that case, and by the judgment of the surgeon.

Every body knows, or ought to know, that these cases, of all others, require at first the most rigid observance of the antiphlogistic regimen; that pain is to be appeased, and rest obtained, by anodynes; that inflammation is to be prevented or removed by free and frequent bleeding, by keeping the body open, and by the administration of such medicines as are best known to serve such purposes; and that, during this first state or stage, the treatment of the limb must be calculated, either for the prevention of inflammatory tumefaction, by such

applications as are in general known by the title of discutients; or, such tumor and tension having already taken possession of the limb, that warm fomentation and relaxing and emollient medicines are required.

If these, according to the particular exigence of the case, prove successful, the consequence is, either a quiet easy wound, which suppurates very moderately, and gives little or no trouble; or a wound, attended at first with considerable inflammation, and that producing large suppuration, with great discharge and troublesome formation and lodgment of matter. If, on the other hand, our attempts do not succeed, the consequence is gangrene and mortification.

These are three general events or terminations of a compound fracture, and according to these must the surgeon's conduct be regulated.

In the first instance, he has indeed nothing to do but to avoid doing mischief, either by his manner of dressing, or by disturbing the limb. Nature let alone will accomplish her own purpose; and art has little more to do than to preserve the due position of the limb, and to take care that the dressing applied to the wound proves no impediment.

In the second stage, that of formation and lodgment of matter, in consequence of large suppuration, all a surgeon's judgment will sometimes be required in the treatment both of the patient and his injured limb. Enlargement of the present wound, for the more convenient dis-

charge of matter[b]; new or counter openings for the same purpose, or for the extraction of fragments of broken or exfoliated bone, will very frequently be found necessary, and must be executed. In the doing this, care must be taken that what is requisite be done, and no more; and that such requisite operations be performed with as little disturbance and pain as possible: the manner of doing business of this kind, will make a very material difference in the sufferings of the patient.

Very contrary or at least very different intentions, seem to me to require the surgeon's very particular attention in the two parts of this stage of the disease.

Previous to large suppuration, or considerable collections and lodgments of matter, tumefaction, induration, and high inflammation, attended with pain, irritation, and fever, require evacuation by phlebotomy, an open belly, and antiphlogistic remedies, as well as the free use of anodynes, and such applications to the limb as may most serve the purpose of relaxation. But

[b] It is a practice with some, from a timidity in using a knife, to make use of bolsters and plaster-compresses for the discharge of lodging matter. Where another or a counter opening can conveniently and safely be made, it is always preferable, the compress sometimes acting diametrically opposite to the intention with which it is applied, and contributing to the lodgment by confining the matter; beside which, it requires a greater degree of pressure to make it efficacious, than a limb in such circumstances generally can bear.

the matter having been formed and let out, and the pain, fever, &c., which were symptomatic thereof, having disappeared or ceased, the use and purpose of such medicines and such applications cease also, and they ought therefore to be discontinued. By evacuation, &c., the patient's strength has necessarily (and indeed properly) been reduced: by cataplasm, &c., the parts have been so relaxed as to procure an abatement or cessation of inflammation, a subsidence of tumefaction, and the establishment of a free suppuration; but these ends once fairly and fully answered, another intention arises, which regards the safety and well-doing of the patient, nearly, if not full as much as the former; which intention will be necessarily frustrated by pursuing the method hitherto followed. The patient now will require refection and support, as much as he before stood in need of reduction; and the limb, whose indurated and inflamed state hitherto required the emollient and relaxing poultice, will now be hurt by such kind of application, and stand in need of such as are endued with contrary qualities, or at least such as shall not continue to relax. Good, light, easily digested nutriment, and the Peruvian bark, will best answer the purpose of internals: the discontinuation of the cataplasms, and the application of medicines of the corroborating kind, are as necessary with regard to externals[c].

[c] It is surprising how large and how disagreeable a discharge will be made for a considerable length of time, in some in-

In short, if there be any rationale in the use of the cataplasm in the first stage, its impropriety in the second must be evident from the same principles. So also with regard to evacuation, and the antiphlogistic regimen; when all the good proposed to be obtained by them has been received, a pursuit of the same method must become injurious, and that for the same reason which before rendered it necessary and beneficial.

A non-attention to this has, I believe, been not infrequently the cause of the loss both of limbs and lives.

Every body who is acquainted with surgery knows, that in the case of bad compound fracture, attended with large suppuration, it sometimes happens, even under the best and most judicious treatment, that the discharge becomes too great for the patient to sustain; and that, after all the fatigue, pain, and discipline, which he has undergone, it becomes necessary to compound for life by the loss of the limb[d]. This, I say, does

stances, from the detention and irritation of a splinter of bone. If therefore such discharge be made, and there be neither sinus nor lodgment to account for it, and all other circumstances are favourable, examination should always be made, in order to know whether such cause does not exist; and if it does, it must be gently and carefully removed.

[d] There is one circumstance relative to compound fractures which perhaps may be deemed worth noting; which is, that I do not remember ever to have seen it necessary to amputate a limb for a compound fracture, on account of the too great discharge, in which the fracture had been united. In all those cases, where the operation has been found necessary on account of the drain, the fracture has always been perfectly loose and disunited.

sometimes happen under the best and most rational treatment; but I am convinced that it also is now and then the consequence of pursuing the reducing, the antiphlogistic, and the relaxing plan too far. I would therefore take the liberty seriously to advise the young practitioner, to attend diligently to his patient's pulse and general state, as well as to that of his fractured limb and wound; and when he finds all febrile complaint at an end, and all inflammatory tumor and hardness gone, that his patient is rather languid than feverish, that his pulse is rather weak and low than hard and full, that his appetite begins to fail, and that he is inclined to sweat or purge without assignable cause, and this in consequence of a large discharge of matter from a limb which has suffered great inflammation, but which is now become rather soft and flabby than hard and tumid; that he will in such circumstances set about the support of his patient, and the strengthening of the diseased limb, *totis viribus;* in which I am from experience satisfied, he may often be successful where it may not be generally expected that he would. At least he will have the satisfaction of having made a rational attempt; and if he be obliged at last to have recourse to amputation, he will perform it, and his patient will submit to it, with less reluctance than if no such trial had been made.

I have said, that a compound fracture either unites and heals as it were by the first intention, which is the case of some few (and was my own), or it is attended with high inflammation,

multiplied abscesses, and large suppuration, demanding all a surgeon's attention and skill, and even then sometimes ending in the loss of limb, or life, or both; or, that all our attempts prove fruitless from the first, and gangrene and mortification are the inevitable consequence of the accident.

The two first I have already spoken to — the last only remains.

Gangrene and mortification are sometimes the inevitable consequences of the mischief done to the limb at the time that the bone is broken; or they are the consequences of the laceration of parts made by the mere protrusion of the said bone.

They are also sometimes the effect of improper or negligent treatment; of great violence used in making extension; of irritation of the wounded parts, by poking after, or in removing fragments or splinters of bone; of painful dressings; of improper disposition of the limb; and of the neglect of phlebotomy, anodynes, evacuation, &c. Any, or all these, are capable either of inducing such a state of inflammation as shall end in a gangrene, or of permitting the inflammation, necessarily attendant upon such accident, to terminate in the same event.

When such accident or such disease is the mere consequence of the injury done to the limb, or produced by it at the time of fracture, it generally makes its appearance very early; in which case, also, its progress is generally too rapid for art to check. For these reasons, when

the mischief seems to be of such nature as that gangrene and mortification are most likely to ensue, no time can be spared; and the impending mischief must either be submitted to, or prevented by early amputation. I have already said, that a very few hours make all the difference between probable safety and destruction. If we wait till the disease has taken possession of the limb, even in the smallest degree, the operation will serve no purpose, but that of accelerating the patient's death. If we wait for an apparent alteration in the part, we shall have waited until all opportunity of being really serviceable is past. The disease takes possession of the cellular membrane surrounding the large blood-vessels and nerves, some time before it makes any appearance in the integuments; and will always be found to extend much higher in the former part, than its appearance in the latter seems to indicate. I have more than once seen the experiment made of amputating, after a gangrene has been begun, but I never saw it succeed: it has always hastened the patient's dissolution.

As far therefore as my experience will enable me to judge, or as I may from thence be permitted to dictate, I would advise that such attempt should never be made: but the first opportunity having been neglected or not embraced, all the power of the chirurgic art is to be employed in assisting nature to separate the diseased part from the sound; an attempt which now and then, under particular circumstances,

has proved successful, but which is so rarely so, as not to be much depended upon.

If the parts are so bruised and torn, that the circulation through them is rendered impracticable, or if the gangrene be the immediate effect of such mischief, the consequence of omitting amputation, and of attempting to save the limb, is, as I have already observed, most frequently very early destruction: but if the gangrenous mischief be not merely and immediately the effect of the wounded state of the parts, but of high inflammation, badness of general habit, improper disposition of the limb, &c., it is sometimes in our power so to alleviate, correct, and alter these causes, as to obtain a truce with the disease, and a separation of the unsound parts from the sound. The means whereby to accomplish this end, must, in the nature of things, be varied according to the producing causes or circumstances: the sanguine and bilious must be lowered and emptied; the weak and debilitated must be assisted by such medicines as will add force to the *vis vitæ*; and errors in the treatment of the wound or fracture must be corrected: but it is evident to common sense, that for these there is no possibility of prescribing any other than very general rules indeed. The nature and circumstances of each individual case must determine the practitioner's conduct.

In general, inflammation will require phlebotomy and an open belly, together with the neutral antiphlogistic medicines; pain and irritation will stand in need of anodynes, and the Peru-

vian bark, joined in some cases and at some times with those of the cooling kind, at others with the cordial, will be found necessary and useful. So also tension and induration will point out the use of fomentation and warm relaxing cataplasms, and the most soft and lenient treatment and dressing. But there are two parts of the treatment of this kind of case mentioned by the generality of writers, which I cannot regard in the same point of view with them. One is, the use of stimulating antiseptic applications to the wound; the other is, what is commonly called scarification of the limb. [Let it be remarked that I speak of both these, as prescribed and practised while the gangrene is forming, as it were, and the parts are by no means mortified.] While the inflammatory tension subsists, alleviation of pain, and relaxation of the wound and swollen parts, in order to obtain a suppuration, and consequently a separation, seem to constitute the intention, which ought to be pursued upon the most rational principles. Warm irritating tinctures of myrrh, aloes, and euphorbium; mixtures of tinct. myrrh, with mel. Ægyptiac. and such kind of medicines, which are found to be frequently ordered, and indeed are frequently used, particularly in compound fractures produced by gun-shot, seem to me to be very opposite to such intention, and very little likely to produce or to contribute to the one thing which ought to be aimed at, I mean the establishment of a kindly suppuration. I know what is said in answer to this; *viz.* that

such kind of stimulus assists nature in throwing off the diseased parts: but this is a kind of language, which I believe will be found upon examination to have been first used without any sufficient or good ground, and to have been echoed ever since upon trust. It had its foundation in the opinion that gun-shot wounds were poisonous, and that the mortification in them was the effect of fire, and it has been continued ever since, to the great detriment of many a sufferer. A gun-shot wound, whether with or without fracture, is a wound accompanied with the highest degree of contusion, and with some degree of laceration; and every greatly contused and lacerated wound requires the same kind of treatment which a gun-shot wound does, as far as regards the soft parts. The intention in both ought to be to appease pain, irritation, and inflammation, to relax the indurated, and to unload the swollen parts, and by such means to procure a kindly suppuration, the consequence of which must be, a separation of the diseased parts from the sound. Now whether this is likely to be best and soonest accomplished by such dressings and such applications as heat and stimulate, and render the parts to which they are applied crisp and rigid, may fairly be left to common sense to determine.

Scarification, in the manner and at the time in which it is generally ordered and performed, has never appeared to me to have served any one good purpose. When the parts are really mortified, incisions made of sufficient depth will

give discharge to a quantity of acrid and offensive ichor; will let out the confined air, which is the effect of putrefaction, and thereby will contribute to unloading the whole limb; and they will also make way for the application of proper dressings. But while a gangrene is impending, that is, while the parts are in the highest state of inflammation, what the benefit can be which is supposed or expected to proceed from scratching the surface of the skin with a lancet, I never could imagine; nor, though I have often seen it practised, do I remember ever to have seen any real benefit from it. If the skin be still sound, and of quick sensation, the scratching it in this superficial manner is painful, and adds to the inflamed state of it: if it be not sound, but quite altered, such superficial incision can do no possible service. Both the sanies and the imprisoned air are beneath the membrana adiposa; and merely scratching the skin in the superficial manner in which it is generally done, will not reach to, or discharge either.

From what has been said, it will appear, that there are three points of time, or three stages of a bad compound fracture, in which amputation of the limb may be necessary and right; and these three points of time are so limited, that a good deal of the hazard or safety of the operation depends on the observance or non-observance of them.

The first is immediately after the accident, before inflammation has taken possession of the parts. If this opportunity be neglected or not

embraced, the consequence is either a gangrene or a large suppuration, with formation and lodgment of matter. If the former of these be the case, the operation ought never to be thought of, till there is a perfect and absolute separation of the mortified parts. If the latter, no man can possibly propose the removal of a limb, until it be found, by sufficient trial, that there is no prospect of obtaining a cure without, and that, by not performing the operation, the patient's strength and life will be exhausted by the discharge. When this becomes the hazard, the sooner amputation is performed the better. In the first instance, the operation ought to take place before inflammatory mischief is incurred; in the second, we are to wait for a kind of crisis of such inflammation; in the third, the proportional strength and state of the patient, compared with the discharge and state of the fracture, must form our determination.

*** In my account of the double bed, which is mentioned in a preceding note, it will be found that it not only is conducive to cleanliness and health, but that it affords great relief to both patient and surgeon on many occasions, and is particularly interesting on the present subject of compound fractures. In these cases, as is well known to practitioners, patients are often obliged to remain in their beds during many months, while disunited bones and loose splinters cause inflammation and abscesses, which furnish a discharge in such quantity as daily to inundate the bandages and pillows.

The necessary changing and renewal of these has hitherto been done at the expence of the surgeon's back, who in a stooping painful posture is obliged to support the heavy limb, often with the additional weight of splints and bandages (for he dares not trust it in other hands), while all the necessary apparatus is replacing. This must be done by his direction; and often in a hurry to save himself, as well as his patient, for his fatigue must necessarily increase every instant, his hands must become unsteady, and the fractured bones will consequently be often jarred and displaced, which cannot fail of bringing on fresh pain and inflammation, and retarding the cure. For fear of a repetition of all this trouble, both patient and surgeon readily incline to put off the evil day till filth and putrid effluvia make it absolutely necessary to be renewed.

Whatever can tend to remedy or remove this great inconvenience, must, I presume, be esteemed a valuable acquisition by all parties concerned—surgeons, patients, and their attendants; and I have great pleasure in saying that this may be effected by the double bed. The bar which is added to it reaching from head to foot at a proper height above the bed, and the ends of it turning down and being fixed in the two uprights which occasionally raise the upper bed, will

give a firm bearing, on which the limb may at any time be suspended in a proper cradle or bandage, while the nurses and attendants remove the dirty pillows, cleanse the bed, and get every thing ready, while the surgeon is preparing his apparatus, to replace it at his leisure, without hurry, trouble, or fatigue.

This, though a valuable is but a secondary use of the bar; as it was originally intended to raise the body of the patient, which may be slung on it either by broad girths introduced under him; or, if that cannot be done, by the sheet on which he lies, the corners of it being tied over the bar. The uprights then being disengaged from their connexion with the upper bed, and the handle being turned, the bar will be raised with the person attached to it, and the upper bed will remain, on which may be put fresh sheets, or what may be wanted: he will then be let down again, and the sheet he has used may be drawn from under him; for it is easy to draw or cut one away, though difficult to introduce a clean one, while a person is lying in bed.

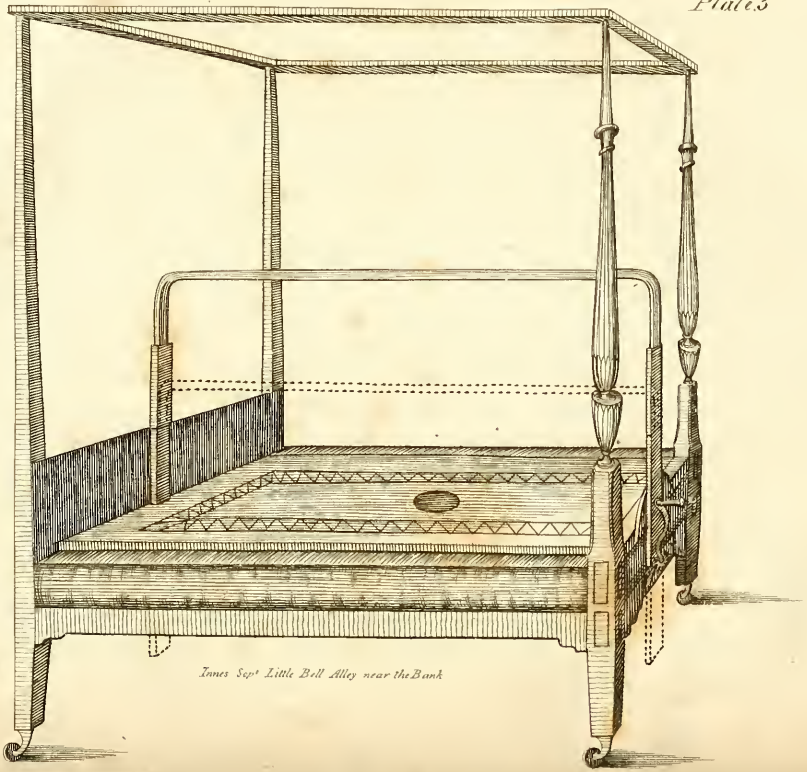
Many other purposes may be served by this bar—for instance, if there should be a wound or other complaint in the back, or parts which could not be seen while the patient was lying down, when he is by these means raised up, it may be examined, and applications made to it, and other good effects may be produced by the bar, which are noticed in the pamphlet.—When the bar is not wanted, it may be laid aside. E.

PLATE III.

In Plate III. is shown the bar, which has been described, raised up and reaching from head to foot: it is fixed laterally in grooves made in the two uprights which occasionally raise the upper bed, but in the present view they are unconnected with it, and merely act on the bar.

The dotted line marks how low the bar may be made to descend, in order to receive any weight which may be attached to it, and which with a steady smooth movement may be raised to any degree, from one inch to twenty, or higher if required.

Plate 3



Innes Sept Little Bell Alley near the Bank

OF DISLOCATIONS
IN GENERAL.

THE principle inculcated so frequently in some of the foregoing pages, concerning the extended or relaxed, that is, the resistant or non-resistant state of the muscles, as depending on the position of the limb, may be applied with equal truth and equal advantage to dislocations, as to fractures. Neither of them can indeed be rightly understood or judiciously treated without such consideration. In both, a perfect knowledge of the disposition, force, attachments, and uses of the muscles, at least those of the limbs, are absolutely and indispensably necessary: and if the young students would be careful in attending to the plain and obvious parts of anatomy; if they would with their own hands dissect the muscles, tendons, blood-vessels and nerves; if they would examine minutely the structure, dispositions, and connexions of all the parts which form the various joints, with their ligaments, and attend to the effects which the actions of the muscles and tendons connected therewith must necessarily have on them, they would have much more precise and adequate ideas of luxations, than many of them have; they would have ideas of their own, not taken upon trust from writers, who have for ages done little more than copy each other; and they

would act with much more satisfaction to themselves.

By what our forefathers have said on the subject of luxations, and by the descriptions and figures which they have left us of the means they used, of what they call their organa and machinemata, it is plain that force was their object, and that whatever purposes were aimed at or executed by these instruments or machines, were aimed at and executed principally by violence.

Many, or most of them indeed, are much more calculated to pull a man's joints asunder, than to set them to rights. I will not go so far as to say, that they are all equally bad or improper; but I will venture to affirm, that hardly any of them are so contrived as to execute the purpose for which they should be used, in a manner most agreeable, or most adapted to the nature or mechanism of the parts on which they are to operate, or to accomplish such purpose in the most easy and most practicable manner; and consequently, as I have already said, they act by force principally.

Nor is that all: some of them labour under another defect, and that capable of producing great mischief; which is, that the force or power of the instrument is not always determinable, as to degree, by the operator, and consequently may do too little or too much, according to different circumstances in the case, or more or less caution or rashness in the surgeon.

I know very well that many of these are now laid aside, and that some few have been so altered,

as to become useful; but still the same kind of principle, on which these instruments were originally founded and constructed, very generally prevails, and violence is used, to the great fatigue, pain, and inconvenience of the patient in many cases, in which dexterity, joined to a knowledge of the parts, would execute the same purpose with facility and ease.

In dislocations, as in fractures, our great attention ought to be paid to the muscles belonging to the part affected. These are the moving powers, and by these the joints, as well as other moveable parts, are put into action: while the parts to be moved are in right order and disposition, their actions will be regular and just, and generally determinable by the will of the agent (at least in what are called voluntary motions); but when the said parts are disturbed from that order and disposition, the action or power of the muscles does not therefore cease: far from it, they still continue to exert themselves occasionally; but instead of producing regular motions, at the will of the agent, they pull and distort the parts they are attached to, and which by being displaced cannot perform the functions for which they were designed.

From hence, and from hence principally, arise the trouble and difficulty which attend the reduction of luxated joints. The mere bones composing the articulations, or the mere connecting ligaments, would in general afford very little opposition; and the replacing the dislocation would require very little trouble or force, was it not for the resistance of the muscles and tendons

attached to and connected with them; for by examining the fresh joints of the human body, we shall find that they not only are all moved by muscles and tendons, but also, that although what are called the ligaments of the joints do really connect and hold them together, in such manner as could not well be executed without them, yet, in many instances, they are, when stripped of all connexion, so very weak and lax, and so dilatable and distractile, that they do little more than connect the bones and retain the synovia; and that the strength, as well as the motion of the joints, depends in great measure on the muscles and tendons connected with and passing over them; and this in those articulations which are designed for the greatest quantity, as well as the celerity of motion. Hence it must follow, that as the figure, mobility, action, and strength of the principal joints, depend so much more on the muscles and tendons in connexion with them, than on their mere ligaments; that the former are the parts which require our first and greatest regard, these being the parts which will necessarily oppose us in our attempts for reduction, and whose resistance must be either eluded or overcome; terms of very different import, and which every practitioner ought to be well apprised of.

From the same examination is to be obtained a kind and degree of very useful information, which the skeleton cannot afford. I mean an acquaintance with the ligaments themselves, both external and internal; the cartilages, both fixed and move-

able; and the parts furnishing what is called the synovia.

This, to those who are perfectly acquainted with the subject, may seem too obvious to have needed mention; but no one who has not examined the joints can possibly have this kind of necessary knowledge; and I am convinced that there are many practitioners who have no idea of articulations, but what the assemblage of dry bones has furnished them, and which must be very inadequate.

I have neither leisure nor inclination at present to enter into this matter minutely, or indeed as it deserves; beside which, I have, I fear, sufficiently exercised my reader's patience already in the foregoing sheets. I will therefore detain him no longer than while I mention a few leading principles relative to luxations in general, drawn from the structure of the parts concerned, and which appear to me to be applicable, with very little if any variation, to every particular species.

1. Although a joint may have been luxated by means of considerable violence, it does by no means follow, that the same degree of violence is necessary for its reduction.

2. When a joint has been luxated, at least one of the bones of which it is composed is detained in that its unnatural situation by the action of some of the muscular parts in connexion with it; which action, by the immobility of the joint, becomes, as it were, tonic, and is not under the direction of the will of the patient.

3. That the mere bursal ligaments of some of the joints, endued with great mobility, are weak, distractile, and constantly moistened; that for these reasons they are capable of suffering considerable violence without being lacerated; but that they are also sometimes most certainly torn.

4. That did the laceration of the said ligaments happen much more frequently than I believe it does, yet it cannot be a matter of very great consequence, as it neither totally prevents reduction, when timely and properly attempted, nor a consequent cure[f].

5. That supposing such accident to be frequent, yet as it is impossible to know, with any kind of

[f] In the accident of a dislocated tibia, in consequence of a broken fibula, the strong, inelastic, tendinous ligaments, which fasten the end of the former bone to the astragalus and os calcis, are frequently torn; and as these by proper care almost always do well, and recover all their strength, there is the greatest reason to expect, that the more weak, distractile ones do the same. The only mischief which seems most likely to follow from a laceration of the latter, is from an effusion of the synovia; of which I think I have (in a bad habit) seen an instance in the joint of the ancle. That the laceration of the bursal ligament of the shoulder cannot be a frequent or general impediment to reduction, appears to me, from my never having, in more than twenty years' care of an hospital, met with a single instance of its impracticability, when attempted in time.

For it can hardly be supposed, that such kind of accident should never have fallen to my lot, or to the people who have acted under me.

But even if this could be supposed, I can also say, that I do not remember impossibility of reduction to have happened to any of the other gentlemen of the house, under the same circumstances.

certainty, whether it has happened or not, or in what part of the ligament, it cannot be admitted as a rule for our conduct, nor ought such mere conjecture to produce any deviation from what we ought to do, were there no such supposition. Could we know with certainty when and where this had happened, very useful information might indeed be drawn from it.

6. That all the force used in reducing the luxated head of a bone, be it more or less, be it by hands, towels, ligatures, or machines, ought always to be applied to the other extremity of the said bone, and as much as possible to that only.

In every joint capable of dislocation, the same circumstance which renders it liable to be displaced, is also a very considerable assistance in its reduction. I mean the dilatability or distractile power of the ligaments, their capacity of giving way when stretched or pulled at.

This is perhaps the strongest argument which can be produced, why all the force made use of in reducing a dislocated joint should be applied to that bone only, and not to the next. By the yielding nature of the ligaments of the luxated joint, reduction is to be accomplished. The ligaments of the other articulation, which is not luxated, are yielding also; and all the force which is applied to the bone below or adjoining, must necessarily be lost in the articulation which is not luxated, and can be of little or no service in that which is.

Let this principle be applied to the dislocation

of the joint of the shoulder, and it will show us why the ambi, in which the whole arm is tied down, and subjected to the extending power of the said instrument, is defective, and may be pernicious. Why instruments built on the same general principle, but in which the fore-arm is not fastened down, but left at liberty and not subjected to the ligature, execute their purpose with a great deal less force. Why the vulgar but frequently very successful method of reducing this joint, by placing the operator's heel in the axilla of the supine patient, sometimes fails, the surgeon not having proper assistance, and contenting himself with pulling at the patient's wrist only. It will also show us, why, in the case of a luxated os femoris at the joint of the hip, the strength of five or six people divided between the joint of the knee and that of the ancle, shall be insufficient; and that of four, nay three of the same assistants, shall in the same case prove sufficient, by being all, and properly applied to the knee and femur only, as I have more than once seen.

Many other applications of this principle might be made, but these are sufficient to those who understand the principle itself and see its force.

7. That in the reduction of such joints, as are composed of a round head, received into a socket, such as those of the shoulder and hip, the whole body should be kept as steady as possible, for the same reason as in the foregoing.

8. That in order to make use of an extending force with all possible advantage, and to excite

thereby the least pain and inconvenience, it is necessary that all parts serving to the motion of the dislocated joint, or in any degree connected with it, be put into such a state as to give the smallest possible degree of resistance.

This I take to be the first and great principle by which a surgeon ought to regulate his conduct in reducing luxations. This will show us why a knowledge of all the muscular and tendinous parts, acting upon, or in connexion with the articulations, is absolutely necessary for him who would do his business scientifically, with satisfaction to himself or with ease to his patient. It will show us, that the mere position of the limb below the luxated joint, is what must either relax or make tense the parts in connexion with that joint, and consequently that posture is more than half of the business. It will show us, why sometimes the luxated os humeri slips in, as it were, of its own accord, by merely changing the position of the arm, when very violent attempts, previous to this, have proved successless. It will show us why extending the arm in a straight line horizontally, or so as to make a right angle with the body, must, in some instances, render all moderate attempts fruitless. Why the method of attempting reduction by the heel in the axilla is so often successful, notwithstanding two very considerable disadvantages under which it labours; *viz.* part of the force being lost in the elbow, and the tense state of one head of the biceps cubiti. Why the tying down the fore-arm in the common ambi is wrong for the same reasons. Why the

fore-arm should at all times (let the method of reduction be what it may) be bent; *viz.* because of the resistance of the long head of the biceps in an extended posture. Why, when the os humeri is luxated forward, or so that its head lies under the great pectoral muscle, the carrying the extended arm backward, so as to put that muscle on the stretch, renders the reduction very difficult; and why, on the contrary, the bringing the arm forward, so as to relax the said muscle, removes that difficulty, and renders reduction easy. Why the reduction of a luxated elbow should always be attempted by bending the said joint. Why, when the inner ancle is dislocated in consequence of a fracture of the fibula, it is extremely difficult at all times, and sometimes impracticable, either to reduce or to keep reduced the said joint, while the leg is in an extended posture; and why a bent posture of the leg enables us with ease to accomplish both those ends. Why in the case of dislocation of the head of the os femoris (be it in what manner it may), a straight position of the leg and thigh will always increase the difficulty of reduction; and why that very distorted and bent position, in which the patient will always place it for his own ease, is and must be the posture most favourable for reduction; because it is and must be that posture in which the muscles, most likely to make opposition, are most relaxed, and rendered least capable of resistance[z].

[z] In the attempts for reduction of a luxated hip, there is one

9. That in the reduction of such joints as consist of a round head, moving in an acetabulum or socket, no attempt ought to be made for replacing the said head, until it has by extension been brought forth from the place where it is, and nearly to a level with the said socket.

This will show us another fault in the common ambi, and why that kind of ambi, which Mr. Freke called his commander, is a much better instrument than any of them, or indeed than all; because it is a lever joined to an extensor; and that capable of being used with the arm, in such position as to require the least extension, and to admit the most; beside which it is graduated, and therefore perfectly under the dominion of the operator.

It will show us, why the old method by the door or ladder sometimes produced a fracture of the neck of the scapula, as I have seen it do in our own time.

Why if a sufficient degree of extension be not made, the towel over the surgeon's shoulder, and under the patient's axilla, must prove an impe-

circumstance, which, by being overlooked, or not attended to, has more than once rendered every effort vain.

It is usual, and indeed necessary, to tie down and confine the patient on a bed or table, in order to keep his body firm and steady: one part of the bandage or strapping by which he is confined is fixed in the groin, and, passing over his belly and under his buttock, is fastened above, or rather beyond, his head, to something immoveable. If this bandage be placed (as I have seen it) in the groin on the side of the luxated bone, it will prove, so far from being assistant, that it will necessarily frustrate every attempt.

diment rather than an assistance, by thrusting the head of the humerus under the neck of the scapula, instead of directing it into its socket.

Why the bar or rolling-pin under the axilla produce the same effect.

Why the common method of bending the arm (that is, the os humeri) downward, before sufficient extension has been made, prevents the very thing aimed at; by pushing the head of the bone under the scapula, which the continuation of the extension for a few seconds only would have carried into its proper place.

I know it is said, that mere extension only draws the head of the bone out from the axilla, in which it was lodged, but does not replace it in the acetabulum scapulæ. To which I will venture to answer, that when the head of the os humeri is drawn forth from the axilla, and brought to a level with the cup of the scapula, it must be a very great and very unnecessary addition of extending force, that will or can keep it from going into it. All that the surgeon has to do, is to bring it to such level; the muscles attached to the bone will do the rest for him, and that whether he will or not.

Indeed, if all the rational means and methods for reducing a luxated shoulder be examined, they will be found to act upon this principle, however differently this matter may appear to those who have not attended to it. Even the common ambi suceeds by means of the extension, which the carrying the arm down with it produces, and not by its lever. That part of the

instrument, so far from helping, is often a considerable hinderance, and even sometimes frustrates the operator's intention, by pushing the head of the bone against the scapula, before it is sufficiently drawn out from the axilla.

If it was necessary to add any thing in support of this doctrine, I should say, that the supposition of laceration of the bursal ligament being a circumstance frequently attending this luxation, and proving an impediment to reduction, is a strong inducement to us to be always attentive to the making such extension, it being much more likely that the head of the bone should return back by the same rent in the ligament, when such ligament is moderately stretched out, than when it may be supposed to lie wrinkled or in folds.

10. The last principle which I shall take the liberty to mention, and which I would inculcate very seriously, is, that whatever kind or degree of force may be found necessary for the reduction of a luxated joint, that such force be employed gradually; that the lesser degree be always first tried; and that it be increased *gradatim*.

Whoever reflects on what is intended by extension, what the parts are which resist, and how that resistance may be best overcome, will want little argument to induce him to accede to this principle; the advantages deducible from attending to it, and the disadvantages which may and do follow the neglect of it, are so obvious.

They who have not made the experiment will not believe to how great a degree a gradually in-

creased extension may be carried without any injury to the parts extended; whereas great force, exerted hastily, is productive of very terrible and very lasting mischief.

I know that the vis percussionis, as it is called, has been recommended as having been successful in some difficult luxations; but I have seen such bad consequences from it, that I cannot help bearing my testimony against it. The extensile and distractile quality of the membranes, muscles, and ligaments, enables them to bear the application of very great force to them, without hurt, if such force be applied gradually, and proper time be allowed for the parts to give way in; but great force, suddenly applied, is capable of producing the most mischievous consequences; and that in many other parts of surgery, beside what relates to luxations[h].

[h] I shall take the liberty to remark here, that in obstinate and difficult dislocations, the least painful and most effectual method of reducing them appears to me to be by means of a pulley, by which the extension may be made in any direction; and the force may be applied with precision, as gradually and to as great a degree as may be thought necessary, by the assistance of one person only, which is infinitely preferable to a number of people pulling in different directions. Even in an hospital, where there are a sufficient number who all know what they are about, and what end is to be answered, many hands must pull irregularly, as they draw from different points; and this inconvenience must be much greater in private practice, where the assistants are ignorant and aukward. The patient may also be kept more firm and steady, by means of a broad leathern belt, lined with soft flannel, which surrounds the thorax, and is fixed to a post or some immoveable body, than by any number of assistants, making a coun-

ter extension. This plan, I am convinced, is preferable to the ambi, or any means I have ever seen employed in obstinate cases of dislocated humeri, and may be applied very advantageously to luxations of the os femoris. By the methods commonly in use, the limbs are often so bruised and excoriated, that if the reduction be not effected by the first, a considerable time is lost before the inflammation can be sufficiently dissipated to permit another attempt. The thick buff leather which guards the skin from the pressure of the chord of the pulley, prevents such disagreeable consequences from taking place. E.

END OF THE FIRST VOLUME.

Printed by Wood and Innes, Poppin's-Court, Fleet-Street.

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